

Radio Control CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

47380

Is R/C more affordable
than ever? page 170

April 1995

SPECIAL Servo Guide

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SPEED
SIZE

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best servo
for you

ROAR
Off-Road
Nats

THRASH TESTED



Tamiya Toyota Prerunner



Schumacher Nitro 10 Escort Cosworth



MRC MT-10S

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basics of
electric
R/C

Massive Monster Truck Buildup

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Hot mods for
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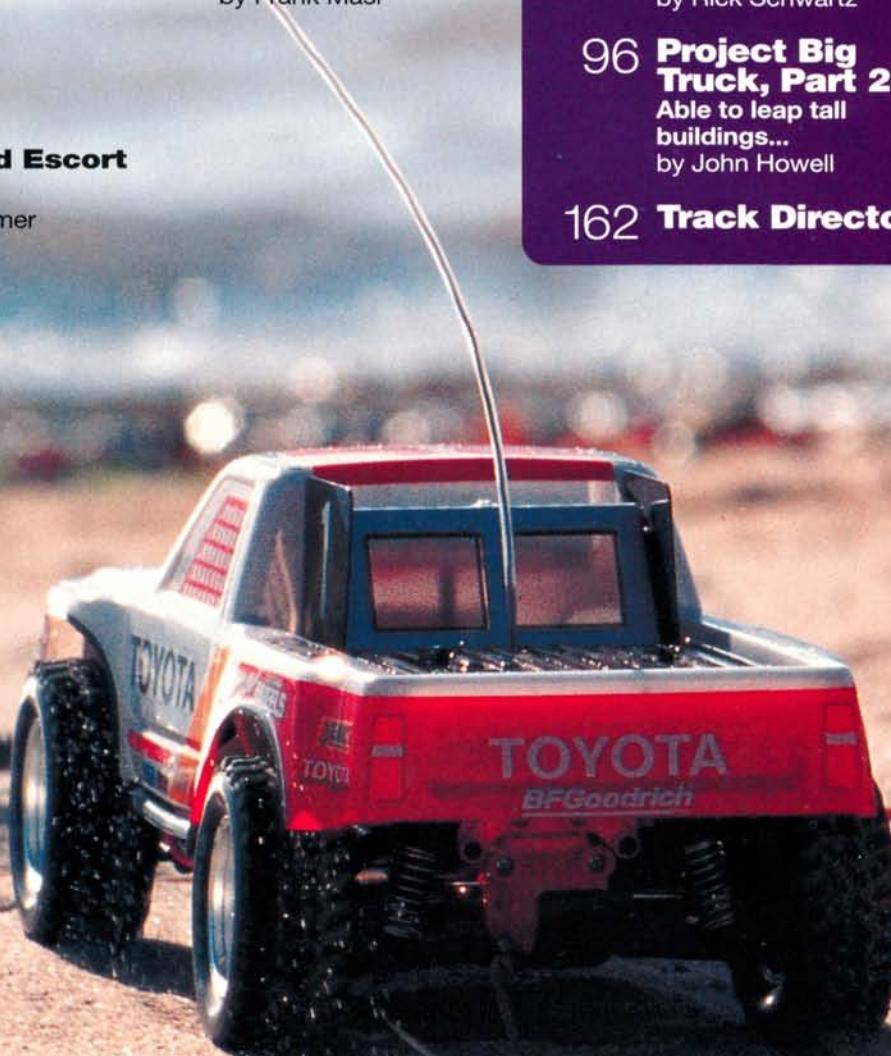
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by John Howell.

This page: photo by
Walter Sidas.





WHEN WAS THE last time R/C brought a smile to your face? Come to think of it, when was the last time you laughed out loud while driving your car? Well, I suddenly realized that I've been wrenching so much on R/C cars lately that I haven't spent too much quality time actually driving my little four-wheel buddies. That's when I started to reminisce about all the fun I've had since I've been in the hobby. After I had thought about all those great driving situations, a few of them really stood out in my mind, but I have to say that these two were the craziest:

Just about a year ago, John Huber and I stayed up all night at his house finishing my Project Big Truck. For those of you who haven't seen this vehicle, it's an ESP-based Clod Buster monster truck. Anyway, we finally got it running. We took it to a local elementary school and proceeded to tear up and down the school parking lot and through the grassy, hilly schoolyard. It was so crazy-looking, and it was ultra-fast.

After we had run it for a while, we found this old telephone pole on the side of the schoolyard, and we drove the truck over to check it out. Because the pole was so big, I had a hard time driving the truck over it.

The pole had rotted slightly, so when I pegged the throttle to get over it, it started to spew out sawdust—a 4WD chain saw! We laughed so hard. The other insane R/C session took place at our off-road testing grounds—the Bethel BMX Super Cross track. John and I were testing four 1/10-scale gas trucks for our '94 gas truck guide. The BMX track is the best place to test out a vehicle's beefiness. We attack jumps that engineers don't usually think of when they're designing these vehicles. We did our testing, shot our photos and then decided to play around a bit.

One of the trucks—a prototype Traxxas (the GRT)—was equipped with an O.S. CZ-Z that was just oozing gobs of horsepower. It was absolutely ballistic. John and I felt that it had enough horsepower to clear the massive tabletop jump that's at the beginning of the track. To get to it, you go roughly 50 feet down a small hill, then you run smack dab into this 5- to 6-foot-high tabletop. The landing section is a gradual slope that goes out about 30 feet or so from the beginning of the jump. It's a pretty hairy obstacle! I definitely wouldn't want to try it on a bike, but an R/C car is a different story!

I brought the Traxxas truck to the starting gate at the top of the hill, turned it around, punched the throttle and launched off the face of the jump. It's this moment that I wish you had all been there for, because words really don't do justice to what happened. The truck launched itself 15 to 20 feet into the air and at least 25 to 30 feet out over the tabletop, and it landed perfectly on the landing slope. It was just too cool! You have to remember that during a race, most trucks and buggies get only 3 to 4 feet off the ground—tops! We're talkin' 15 feet in the air here, folks. It was insane! Now that's what R/C is all about—having fun, whatever you're doing.

Those two experiences got me hooked on monster trucks and jumping very high. In this issue, you'll see "Project Big Truck, Part 2" (the ESP Clodzilla III). But that's not all. We've got a ton of other goodies, too. So check it out and enjoy!

Look for my other insane project—"Jump Truck"—in an upcoming issue.

John Howell

We want to hear from you!

Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chrisc@airage.com; John Howell (Doog)—johnh@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

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LETTERS

WE'RE SORRY

In our "Off-Road Buyers' Guide" (February '95 issue), we printed an incorrect phone number for PCRC. The correct phone number is (314) 623-2728. We apologize for any inconvenience this might have caused.

THE BETTER RACER?

I'm an off-road racer who's interested in getting an electric 1/10-scale 4WD on-road car that can be easily raced. I was looking at Tamiya cars like the Alfa-Romeo 155 V6 T1 that was featured in your May '94 issue, and I want to know of any performance differences between the many 4WD cars that Tamiya makes. What do you think is a good car for under \$250? Thanks for your time, and keep up the great work!

JAVIER ANAYA
Santa Fe Springs, CA

Well Javier, there are currently three 4WD Tamiya platforms from which you can choose: TA01, TA02 and TA02W. Here are the differences:

- TA01 features a shaft-drive 4WD system, a rear ball diff and front bevel-gear diff, front and rear double-wishbone independent suspension, oil-filled shocks and an ABS chassis. The following on-road cars use the TA01 chassis: Nissan Skyline GT-R Nismo, Mercedes-Benz 190E and Schnitzer BMW M3.
- TA02 has its motor, battery and rear gearbox moved forward for better weight distribution (compared with the TA01). It also features a shorter propeller shaft on its 4WD system. Long front-suspension arms place the steering pivot point inside the front wheel's

perimeter for quicker steering reaction, which reduces any understeer tendencies. The following cars use the TA02 chassis: Alfa-Romeo 155 V6 Ti, Calsonic Skyline GT-R, Blitz Toyota Supra Gr.N, AMG Mercedes-Benz DTM D2, HKS Skyline GR-R Gr.A and AMG Mercedes-Benz DTM ProMarkt.

• TA02W is a widened version of the TA02 chassis. As with the TA02, the motor, battery and rear gearbox have been moved forward for better weight distribution, and it features a shorter propeller shaft in its drive system. The TA02W also uses offset front uprights from the TA01 chassis to widen the front track. The rear tires are 6mm wider than the front tires; two-piece front and rear wheels are assembled for a positive offset that widens the car. The TA02W is currently available in only one car—the Nissan 300ZX IMSA-GTS.

All of these cars have tons of hop-ups that are already available, and each one has the capacity to win any local parking-lot race. Hope this helps.

—Doogie

R/C IN THE MOVIES

First, I would like to say that you have a great magazine. Second, I have a "trivia" question that I'm dying to know the answer to. What was the fast, rad R/C Corvette that was used in the movie "The Dead Pool," starring Clint Eastwood? I hope that you R/C know-it-alls can help. Thanks.

JOHN GROLLIMUND
Spangahlem, Germany

The car was a modified RC10, driven by Jay Halsey. It was equipped with eight cells and a Reedy modified motor; its body was a Parma Corvette. For more information on how it was done, look at our August 1988 issue.

—John

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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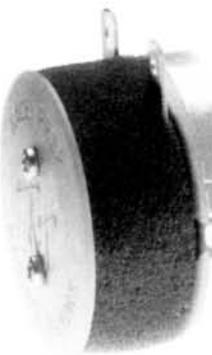
YA GOTTA KNOW YOUR STUFF

I recently bought a Traxxas SRT and started building it. I got stumped halfway through the transmission assembly, and I almost took it to a hobby shop for them to build. But then I saw your article "When to Modify," and it explained how to do it. I tried



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LETTERS

again and finished in a few days. Now I know the truck inside out, and I'm very glad I didn't have to take it to a hobby shop. I'd really love to see you publish a big article comparing several electric trucks. What do you think? Anyway, it a great mag. Thanks for all your help.

MICHAEL ADAMS
Wailuku, HI

Well, Michael, we're glad we could help. It is good to know your truck inside and out, isn't it? If something goes wrong, you'll know what the problem is and how to fix it. As for your electric truck comparison question, we'll feature a "95 Race Truck Guide" sometime soon. Stay tuned! —Doogie

MORE MOTOR

I've recently purchased an MT-10M big-tire monster truck, and I plan to race at small tracks. Could I buy a faster motor? I've been thinking about the Green Machine 2, but I don't know if it will damage my transmission or anything else. Please help!

Your mag is awesome, by the way; I'd rather read *Car Action* than any other magazine.

BOBBY ROBERTS
Kent City, MI

Thanks for the compliments, Bobby. When I reviewed the MRC MT-10M in our January '95 issue, the only thing I wanted more of was get-up-and-go power. With that in mind, here are my orders: march right down to your hobby shop and buy that new Green Machine 2. Don't worry about your transmission; it's beefy enough to handle much hotter motors than the stock 540 that was included with the kit. Have fun! —Doogie

WHINE NOT!

I'd like to take a moment of your time, if I may, to say a couple of things. First, I believe the whole *Car Action* staff does a fantastic job of publishing the magazine. I am a subscriber, and I look forward to receiving it every month. That said, I'd like to comment on the "Back Lot" column in the January '95 issue. Please do not take it personally.

Chris Chianelli offered some ideas concerning the consumer's availability to participate in parking-lot racing programs. While Chris's ideas are certainly one possible solution to the problem, I do not feel it is up to us, as consumers, to have to get these programs up and running.

Let's face it: this hobby is expensive, no matter what level you are. There are a lot of businesses out there making all kinds of money off us, and what are we getting in return? I believe the manufacturers are putting the consumers in the back seat by sponsoring major pro events and forgetting who is responsible for picking up the bill for those events. The manufacturers owe the consumers something back.

It is only my opinion, but I believe the future of this hobby is to make it less expensive (which, by the way, is a long time coming) and to ensure that people like me, who spend quite a bit of money on the hobby, have adequate facilities to use.

I also suggest to Chris that *Car Action* consider getting involved in this issue. May I suggest that *Car Action* take a leading role in Connecticut by using its knowledge and influence to sponsor various types of recreational racing programs to promote our hobby.

I truly believe that if *Car Action* contacted hobbyists and track owners throughout the state, it could manage one heck of a racing program. Think of it: various types of organized racing for fun or prizes at different locations every week. Sounds great to me.

One last comment: Chris, not all of your readers are kids. Your last sentence says: "Stop whining and start demanding." We wouldn't be whining at all if everybody who makes money off this hobby would get involved on the consumer end and not just with the big manufacturers. Sure, it's nice to see and read about the World's and national championships, but let's remember where our bread gets buttered, shall we?

Also, you should spend less time writing articles like that one and spend more time getting involved

(continued on page 118)

READER'S Rides

DUNE DEMON

This hot ride comes from Charles Price of Milpitas, CA. His Losi LX-T—topped with a Slammer XL body—is powered by an Extreme stock motor and controlled by a Tekin 411G2 ESC, a Tekin FM receiver and an Airtronics Caliber radio. Charles says that this LX-T loves to throw sand on the dunes of Monterey's beaches when it's not at the track flinging dirt with the other racers.



FASTER THAN A SPEEDING BULLET?

Marvin Bonkowski sent us this photo of his red-hot '32 Parma Coupe. Powered by a Topaz 11-turn triple and controlled by a Tekin 610R ESC and a Futaba FPR112JE receiver, his Coupe has been modified with a soda-can diff housing, bumpers, license plate, mirrors, door handles with key locks, a visor and a bungee-cord rumble battery tray that holds a 6-cell pack. Marvin says he has spent more time wrenching on it than driving it, but he really enjoyed putting on the finishing touches and watching it tear up the road at about 40mph.

RAMBUNCTIOUS RIDE

John Compton of Arlington, TX, sends this photo of his pride and joy. His Associated RC10GT is decked out with Protoform's new Rambunctious GT body, which John airbrushed himself. Power comes from an O.S. CZ-Z that's equipped with an MIP Stinger pipe and an MIP 4-N-1 clutch. It's all controlled with an Airtronics Rival Sport radio.



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah of Radio Controlla chooses your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1995. Write your address and phone number on the back of each photo you send, in case we need to contact you.



TEXAS TRASHER

This hot-looking ride comes from Jody Kaase of Bellville, TX. This Modified Clod Buster has a Clod-A-Leaver II racing chassis and suspension. Jody has modified this Clod with a Novak HRV ESC, Trinity matched 4400mAh D-cell batteries, ball bearings, Sapphire motors, Kyosho USA-1 Nitro tires and black shocks and a 6-cell 1700 SCRC battery pack. It's controlled with a Futaba Magnum Sport radio system. The Ford Bigfoot body was specially painted by Scot Bich of Bich'n Bodies.

**TO THE MOON, ADAM!**

This R/C model rocket vehicle military launcher comes from Adam Patterson of Altadena, CA. The Tonka carrier features 6WD, 6WS and a handmade gearbox. Adam attached the long body of the launcher—equipped with model rocket with parachute—to the Tonka to complete his ready-to-launch military machine.

DADDY'S LITTLE GIRL

Steve Key of West Bend, WI, built this car for his daughter so that she could join in at the track. Barbie rides in the pink wedge body that's mounted on a 10LSS. The 10LSS features a Trinity Slot Machine II and a Novak 410-M5 speed control. Steve tells us that the car works great and that Barbie looks great with her blond hair blowing in the wind while she's driving. Hope your daughter is enjoying it, Steve.

**THE INCREDIBLE SHRINKING R/C**

Roger Sittnikow of Helsinki, Finland, sends us this photo of his 1/87-scale Scania 142M. It's equipped with a Varta 4.8V battery pack and Futaba microservos. Roger says that his Scania is registered with "The Guinness Book of World Records," but has not yet been officially named the smallest R/C car in the world. He plans to keep making it smaller until it holds the record. Good luck, Roger!

**R/C SIX-PACK**

This photo of Craig O'Neal's six rad rides was taken on the future site of Craig's very own off-road track at his home in Nashville, GA. The Tamiya Falcon features a stock 540 motor that's controlled by a Futaba Mag Sport and an MC112B ESC. The Tamiya Bullhead is mostly stock, but Craig has added full ball bearings. The RC10 sports a custom fiberglass chassis and a Slot Machine motor, and the Losi JR-XT has been modified with full ball bearings and a Pocket Rocket motor. The Tamiya Blackfoot, which belongs to Craig's 9-year-old son, is all stock with a Hitec/RCD radio and ESC. The newest addition to the collection, the Bolink Digger, belongs to Craig's 14-year-old daughter and features off-road tires and a Pocket Rocket motor. So, Craig, when is the first race?

In search of fun
and glory, cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP

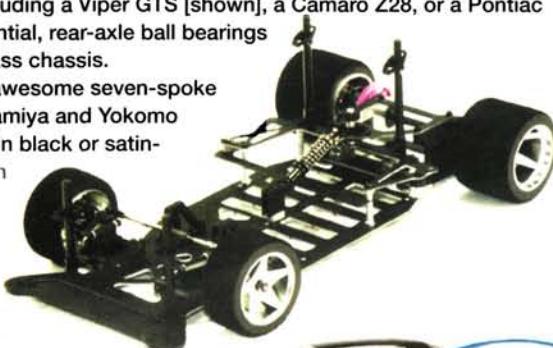
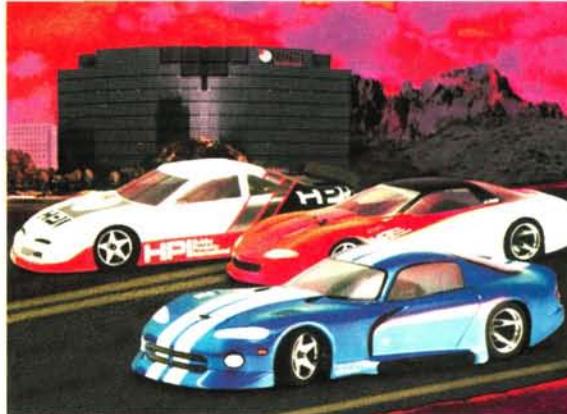


Primo Parking- Lot Racer

HPI, a company well-known for its parking-lot prowess, allowed me to check out their newest secret project—tentatively code-named the "Street Machine." This new $\frac{1}{10}$ -scale street sweeper uses an all-new double-wishbone front suspension and a triple pivot

rear suspension that's currently found on HPI's new F1 car. The Street Machine will have standard equipment, such as a set of cool-looking satin-chrome Super-Star road wheels, your choice of street bodies (including a Viper GTS [shown], a Camaro Z28, or a Pontiac Grand Prix), a limited-slip differential, rear-axle ball bearings and a high-quality, black-fiberglass chassis.

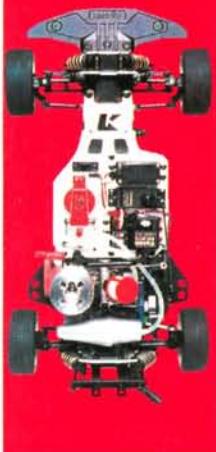
Also new from HPI are these awesome seven-spoke wheels that were designed for Tamiya and Yokomo sedan racers. The wheels come in black or satin-chrome finish and are available in standard and wide sizes. So, if you're looking to customize your new sedan racer with a new set of wheels, these might be for you.



Kyosho GP-10

Here's a first look at Kyosho's new $\frac{1}{10}$ -scale on-road gas chassis and the bodies it will be available with—the Toyota Supra and the Opel Calibra.

Rumor has it that, in the near future, this chassis will be offered with some Trans Am-style bodies for the American market. Don't worry, I'll keep you posted.



The Tornado II oval-racing-truck bodies from Dahm's Racing Bodies come in both narrow and standard widths for chassis such as the Associated RC10L and RC10SS. These bodies will also fit stadium chassis such as the Tamiya Prerunner and Chevy S-10, or monster truck chassis such as the Kyosho USA-1 and the Tamiya Clod Buster and Super Blackfoot. These new bodies feature: a flatbed cover, a separate 2-inch rear spoiler and a new grill decal. For more information contact: Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931-0360; (707) 792-1316; fax (707) 792-0137.

Super Nastruck





PRO-LINE AT BAJA 1000

P

ro-Line product-development director Tim Clark, once a chief fabricator with off-road legend Walker Evans' Team, has built his own Class 8 desert truck from the ground up. Sixteen hours and 633 miles across the Baja 1000 terrain, Tim's truck finished fourth behind factory notables such as Ford's David Ashley and Team Dodge's Brian Stewart. Tim's Desert Duster features: hand-built suspension with 24 inches of travel, fiberglass bodywork and a 500hp small-block Chevy engine that gets 2 miles per gallon on the rough stuff and a whopping 3 1/2mpg on the open road!

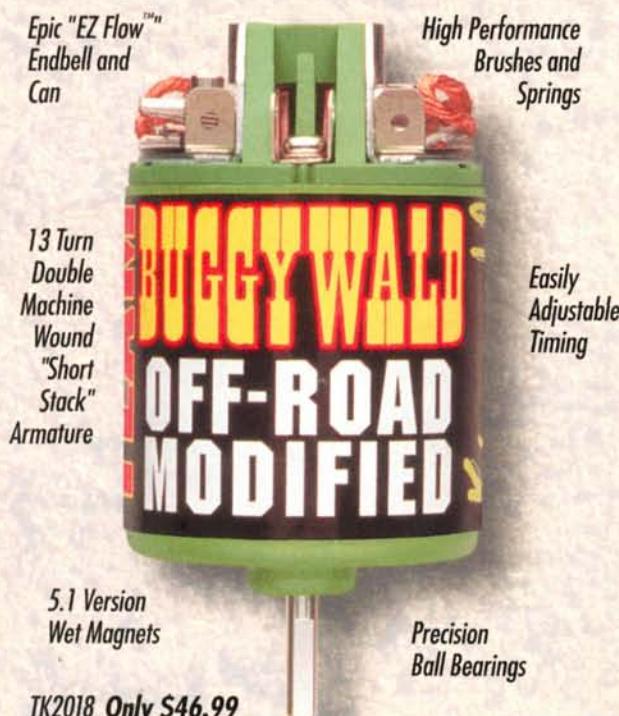
Check out those original full-scale Pro-Line XTR Dirt Hawgs on the front and rear! Rumor has it that Tim showed up for qualifying with Edge front tires, Fuzzies on the rear and a Reedy Mr. D 14-turn double under the hood. I can believe that.

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YOKOMOTION

We've been talking for months about how hot parking-lot racing has become—especially out on the "Left Coast." Well, we've always been big fans of Yokomo's products, and we've just received word from their U.S. distributor—Ultimate Hobbies, out in Orange, CA—that Yokomo's premier parking-lot pounder, the YR-4, is literally tearing up the tracks out west with major wins. Here are a few:

- **NORRCA California State On-Road**—Stock: Christian Durand; Modified: David Gestoso.
- **NORRCA National On-Road Championships**—Modified: Greg Hodapp (the top seven finishers in the Modified A-Main were YR-4s).
- **NORRCA Fall Classic**—Modified: Christian Durand.
- **NORRCA "Taking it to the Streets" Paved Road Course Series**—Stock: Jon Shigetomi; Modified: David Gestoso.

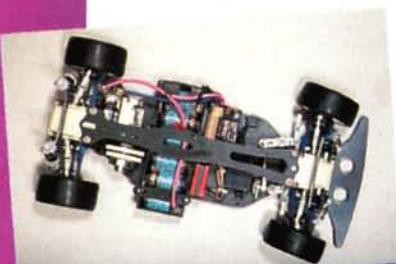
According to Cliff Murakami, manager of Ultimate Hobbies, they've sold more than 1,000 YR-4s in a relatively short time!

We have a special treat for those of you who want to hear more about this winning parking-lot racer. Contributing author Doug Mertes saw his first YR-4 a little while ago, and he just had to go out and buy one. Since then, he has completely tricked it out (see photos). As soon as Doogie saw Doug's wild ride, he got to work on his own Project YR-4—"Doog's Doug Destroyer." Hmm.... Is this a little friendly competition? You'll find their articles on this hot

car in upcoming issues.

Hobby shop owners who

would like to be Yokomo distributors can contact Ultimate Hobbies at (714) 921-0424.



Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

- Oil weight remains stable under increasing track heat, so suspension set-up won't change
- 1/2 weights from 10-70
- Allows precise tuning of your suspension to match changing track conditions



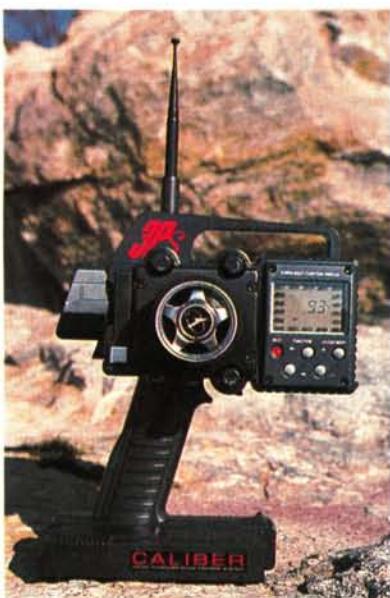
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All Weights**

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New Air Arrival

There's no doubt that the Airtronics Caliber is one of the most—if not *the* most—popular racing FM radio systems currently on the market. Multinational and world champ Joel Johnson swears by it. So then, what's this thing you see before you? Progress, my boy, progress! This is the next generation in the Airtronics Caliber lineup—the Caliber 3Ps. It's cosmetically the same as the old Caliber, but internally, it's very different. It features a 400-percent-faster processing speed, which translates into increased responsiveness. Also, the new radio's programming has been simplified; you now have to deal with only four—instead of six—setup buttons. Current drain has been improved, too, and that prevents this radio from being as hard on batteries. There are also a few other hot features, but you'll have to wait until we review the radio in a future issue. So stay tuned!

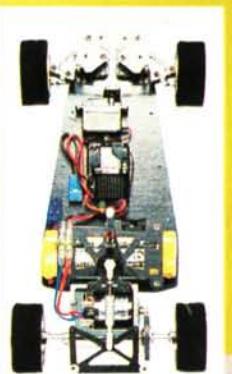
want to check out—these hot items. They both come in a variety of colors: black, silver, blue, purple and even polished versions. The manifolds are available in both pull-start and non-pull-start configurations. Yeah, so put that in your pipe and smoke it!

The Shape of Things to Come?



Full-Scale Parking-Lot Racing

Gymkhana-style racing, very popular in the '70s, was run in mall parking lots where pylons were set up and cars ran one at a time against the clock. You could literally show up with the family wagon and give it a try. Powered by a 1,600cc, 4-cylinder, dual-overhead cam Ford Cosworth, the 1,300-pound Lotus Super-7, shown here in the 1/10-scale version by ABC Hobbies, was the king of the event. It's a cool-looking car; my first slot car was a Lotus-7. I wish ABC products were readily available in this country. Can anybody help?



SMOKIN' PIPES

Wanna add a little flash to your RC10GT? Well, Associated has a couple of new items that you might



WHAT'S

new



KYOSHO

Rampage Pro 2WD

This high-performance, $\frac{1}{10}$ -scale, gas-buggy kit features: a race-proven Super Sprint Transmission™ and 3-shoe clutch; independent suspension; a light, blue-anodized Duraluminum™ chassis; oil-filled shocks; a racing-buggy body; wheels and tires; and much more. The Rampage Pro is available without an engine, or you can get it with the powerful O.S. .12 CZ-R that has a heavy-duty recoil starter.

Part nos. and prices—**KYOC0510** (without engine), \$319.99; **KYOC0511** (with CZ-R engine), \$469.99. Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948.



DURATRAX Power-Shot Motor Spray

Prolong your motor's life and maintain top power by using this environment-friendly electric-motor cleaner. This very affordable cleaner uses a 100-percent-perchloroethylene formulation that doesn't harm the atmosphere but does clean effectively. Part no.—DTXC2455; price—\$5.99 (16 ounces). DuraTrax/Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.

PRO-LINE/JACO

F1 and Indy Trued Donuts

These new Trued Donuts come ready to mount on your Tamiya and Kyosho F1 and Indy cars; they'll provide ultimate performance and unsurpassed, race-proven traction. They're available in three compounds: pink and purple—specially formulated for asphalt; white—ideal for carpet. Part nos. and prices—2250 (pink—for F1 and Indy front wheels), \$14.95; 2251 (purple—for F1 and Indy rear wheels), \$17.95; 2252 (white—for F1 and Indy front wheels), \$10.95; 2253 (white—for F1 and Indy rear wheels), \$12.95.

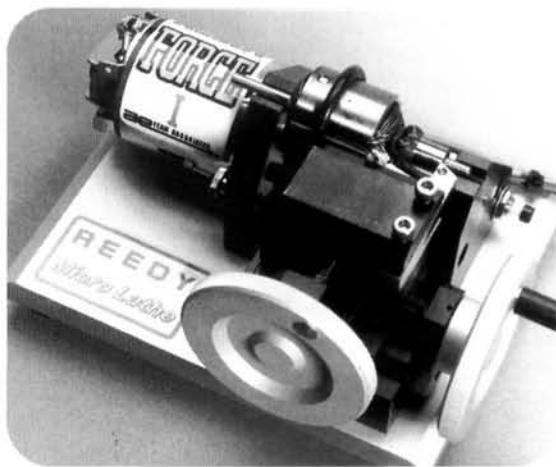
Pro-Line/JACO, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

REEDY MODIFIEDS Comme Lathe

This modified-motor commutator-truing lathe works for both standard and lay-down commutator armatures. Compact and portable, it comes with a Reedy stock motor already installed, and it includes a replaceable tri-point carbide insert cutter. It's simple to operate and to adjust and will provide precise, consistent cuts every time.

Part nos. and prices—**SP-300** (comm lathe), \$250; **SP-301** (replacement comm lathe carbide insert), \$20.

Reedy Modifieds; distributed by Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.



THORP MFG. INC. Aluminum Break Adapter

This new adapter replaces the plastic hex brake adapter on the Associated RC10GT. Made of aluminum, this adapter won't melt, so it keeps you out of the pits and in the race.

Part no.—4781; **price**—\$5. Thorp Mfg. Inc., 4054 E. Mission Blvd., Pomona, CA 91766; (714) 622-6518; fax (714) 622-2947.

DAHM'S RACING BODIES

Tornado II

This hot, new, clear-Lexan, narrow truck body features super-aerodynamic styling, a flatbed cover, a separate 2-inch rear spoiler and a truck grill decal. It's designed to fit: narrow superspeedway cars such as the Associated RC10LS; race trucks such as the Tamiya Toyota Prerunner and the Chevy S-10; and monster trucks such as the USA-1, Clod Buster and Super Blackfoot.

Part no.—D016; **price**—\$19.98.

Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931-0360; (707) 792-1316; fax (707) 792-0137.





TEAM LOSI Lightweight Gear/Slipper Shaft

These high-grade, aluminum, one-piece slipper shafts with gears will give you a lighter, quieter and smoother transmission. These shafts are hard-coated to last longer, and they're precision-machined for a perfect mesh. They're available for both 2.19:1 and 2.61:1 ratios, and they're a direct replacement for the slipper shafts and top gears that are in all Double-X and Double-X retro-fit transmissions.

Part nos. and prices—A-9930 (2.19:1 ratio HC), \$11.95; A-9932 (2.61:1 ratio HC), \$11.95. Team Losi Inc., 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9728; fax (909) 590-1496.



THUNDER TIGER PRO/GP-Series Engines

The Pro .12 BB ABC heat sink features a precision-cast crankcase, a heat-sink head, a one-piece crankshaft, an ABC piston/cylinder assembly and aerospace-quality ball bearings. It includes a reliable rotary carb and an efficient air cleaner to filter out dust and dirt. Bolt in some horsepower from Thunder Tiger!

Part no.—TTR9403; **price**—\$129.99.

Thunder Tiger USA, 2430 Lacy Ln. #120, Carrollton, TX 75006; (214) 243-8238.

DU-BRO Super-Strength Servo Arm

These Super-Strength Servo Arms have impressed R/C car enthusiasts with their strength and performance. They're molded out of strong, long-fiber composite material and are available in standard and long versions to fit Futaba, JR, Airtronics, Hitec, Hobbico and Tower Hobbies servos.

Part nos. and prices—672 (long—for Hitec, Tower Hobbies and Hobbico Command servos), \$9.95; 673 (standard—for Futaba servos), \$7.95; 674 (standard—for JR and Airtronics servos), \$7.95; 675 (standard—for Hitec, Tower Hobbies and Hobbico Command servos), \$7.95. Du-Bro Products Inc., 480 Bonner Rd., P.O. Box 815, Wauconda, IL 60084; (800) 848-9411.



BOLINK 1970 Plymouth Superbird

This is the first classic stock-car body in the industry! It's designed to fit most super-speedway, narrow chassis, and it comes with a one-piece rear wing and installation instructions.

Part no.—BL-2287; **price**—\$19.95. Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252; fax (404) 963-7334.



SCHUMACHER Nitro 10 2-Speed Tranny

If you own a Schumacher Nitro 10 buggy or truck and you want it to go even faster, check out Schumacher's new 2-speed tranny. The unit comes with a new transmission top shaft and all the other components that you need to make the conversion. The point at which the tranny shifts into gear is fully adjustable, so you can tailor performance to a particular track. The 2-speed unit will work on any

on- or off-road Nitro 10 chassis.

Part nos. and prices—U1665 (Nitro 10 off-road), \$169.50; U1666 (touring car), \$169.50.

Schumacher Inc., 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593.



adjust your speed control and gear mesh under load to maximize performance.

Part no.—90550; **price**—\$379.95.

Parma International/PSE, 13927 Progress Pkwy., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



by John Huber

Slip Slidin' Away

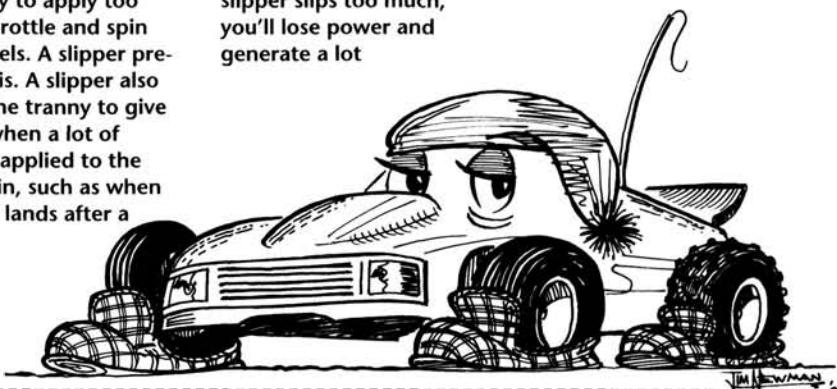
I've got one question: what in the world is a slipper clutch for? I noticed that all Traxxas trucks have them. I own a Traxxas Blue Eagle LS II and, let me tell you, the slipper clutch really gets on my nerves. It messes up my performance and I can't keep up with my friend's car. Answering this question would help me out a lot! Thanks.

STEVE VAN HOOK
Bridgeton, MO

A slipper clutch is designed to limit the amount of power delivered to your car's wheels. On a slippery track, it's very easy to apply too much throttle and spin the wheels. A slipper prevents this. A slipper also allows the tranny to give a little when a lot of stress is applied to the gear train, such as when your car lands after a

big jump with the throttle on. A slipper should be adjusted so that it slips for a couple of feet from a dead stop. If your slipper slips too much, you'll lose power and generate a lot

of heat. Tighten the slipper fully and back it off enough to give slip for a couple of feet.



Down Under

I'm writing to you from Brisbane, Australia, to tell you that I think your magazine is great and to ask you a few questions. I'm very fond of R/C cars. I own a Tamiya Clod Buster that is totally box-stock, except for the paint job. About a month ago, I wrecked it; I hit a concrete plant pot and broke the front bumper, the ladder bar



and the motor. I run a Tamiya 1200mAh 6-cell battery pack and need a good twin motor to replace my broken one. What would be a good choice? Also, I have always wondered how gas engines turn off. Could you please explain?

RYAN TURESSON
Brisbane, Australia

Ryan, because the Clod uses two motors, you should get a pair of identical motors. If you're using the motors that came with the kit, you can get another Tamiya stock motor and use it as it is. If you want a little more speed, try a pair of matched modified motors. If you get new motors, make sure that one is reversed! Because the Clod uses identical gearboxes in the front and rear, one motor has to turn in the opposite direction. If you use motors with zero degrees of timing, you can simply reverse the motor leads on one to make it spin in the opposite direction. If you switch the leads on a motor with any timing advance, however, it will run more slowly. Try a set of Trinity's Matched Madness motors; they're designed for the Clod.

To shut off a gas engine, you can cut off either the fuel or the air, block the exhaust, or just tap the flywheel with your shoe.

Recoiling in Horror

About a year ago, I was given a Kyosho Sandmaster 10 for Christmas. Two or three months later, the O.S. .10 FP-B engine (with a recoil starter) started to give me some trouble. I could never get it started, and the string eventually snapped. I got a replacement for the broken recoil, but it still wouldn't start. I checked the glow plugs a number of times, but that didn't help. Is a .10 FP-B ABC engine without the recoil starter compatible with the Sandmaster 10 structure? If it is, how would I go about starting this engine without the recoil starter?

ANDREW TOKARSKY
Newark, DE

Andrew, I'm sorry to say that there's no access to the flywheel on this car, so you can't start it with a hand-held starter. You should have no problem starting the .10 FP-B, as long as the lines are connected and they're delivering fuel. Replace the plug (I recommend the McCoy MC-59), and check all your fuel lines. Press the fuel primer button a few times until you see fuel entering the carburetor. Try starting the engine with the needle at three turns out. If it doesn't start after the first dozen pulls, you might be flooding the engine. Remove the plug, invert the car, and give it a couple of pulls to clear the engine. This should do it. Just make sure that you clear the engine again if it becomes hard to turn over.





Tranny Trouble

I recently bought a Losi Double-X. I love the car, but I've been having an immense amount of

trouble with the tranny. My problem is with the screw and locknut that hold the outdrive and the diff gear together. Every

time I try to tighten the screw, it strips. But if it's too loose, it just sits there and winds out. Am I doing something wrong,

or is this a problem that will always exist? Is there any way to fix it—like replacing the whole outdrive—or should I just replace the tranny? I'm hoping that you guys will be able to help me. You seem to know everything about these problems, and none of the hobby shops around here has been able to help me. Thank you for your time.

JARRED BELLROMINI, Galt, CA

Jarred, you should be able to get the screw tight enough to operate without stripping out the nut. I called Jack Johnson from Team Losi on this one, and he said that perhaps you have two of the bearings in the wrong place. The center diff bearing and the top shaft bearings look similar, but one is metric and one is standard. If you put the wrong one in the diff, you'll never get it tight enough, and you'll strip the nut trying. Swap the two, and you should be back in business!



Gearing and Steering

Let me start by saying, "Great mag!" Next, I have a few questions about my Kyosho USA-1. I've beefed it up with almost every hop-up available. I guess my main question is about gearing down. How do I do it? I already run 11-tooth pinions and I can't go any smaller. I tried 9-tooth pinions, but they don't reach the spur gear. Does someone make a larger spur gear for Thorp diffs, or am I doomed to high speeds only?

My next question is about steering. I already have a high-torque servo (it provides approximately 90 oz.-in. of torque), but I only get steering when it's moving. Why? I imagine that every monster-truck owner has this problem, but what's the cure?

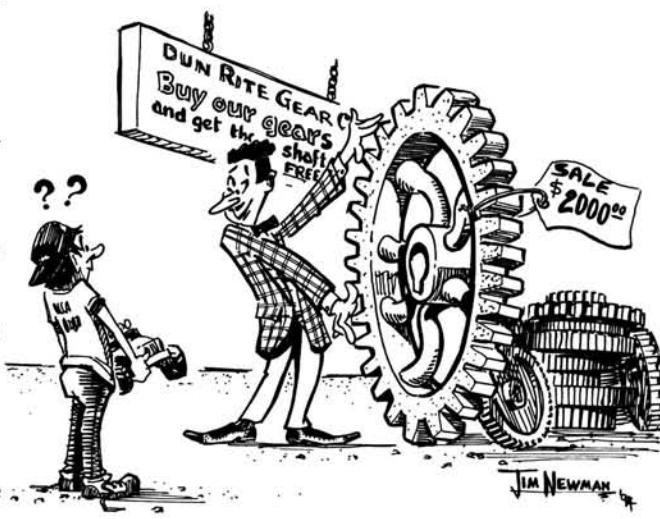
My final question is about rear steering. I'm planning to add rear steering, but I need a servo that turns in the opposite direction. Can I change one of my old servos to do this, or do I need a new one? If so, does Futaba make a reverse servo? Your help would be greatly appreciated.

DAVID LOOYE
Ft. Polk, LA

David, you have a couple of options for adjusting the gear ratio. You can try to use the smaller pinions and modify the motor mounts to allow the gears to mesh. You'll have to make the two motor-screw slots longer. Your other option is to get an external reduction gear set, such as the one made by

Stormer. Unfortunately, they don't make it any more, but you might still be able to find one in a hobby shop. As for the servo, very few can turn the huge truck tires when the vehicle isn't moving. I wouldn't worry about it too much; just keep moving! I also wouldn't bother with the rear

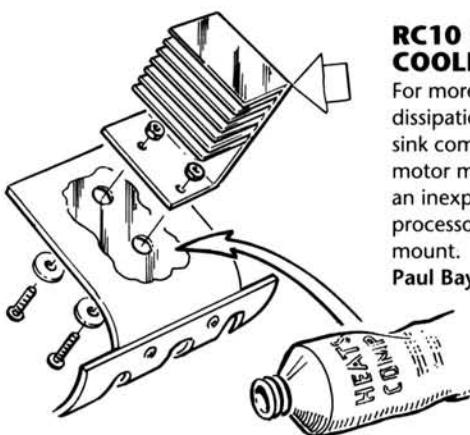
steering. You could rig a linkage from your existing servo, but 4WS often makes it very difficult to drive a straight line. If you want to try it, make the connection to the opposite side of the servo horn. And, just for your info, Futaba does make reverse servos. ■





PIT TIPS

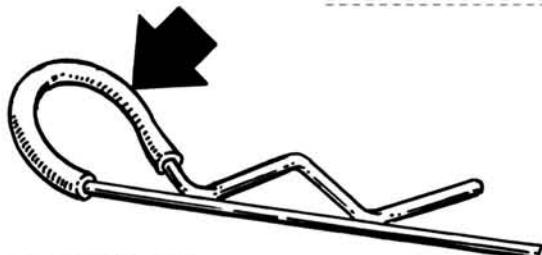
by Jim Newman



RC10 MOUNT COOLING

For more effective heat dissipation, smear heat-sink compound on your motor mount then screw an inexpensive micro-processor heat sink to the mount.

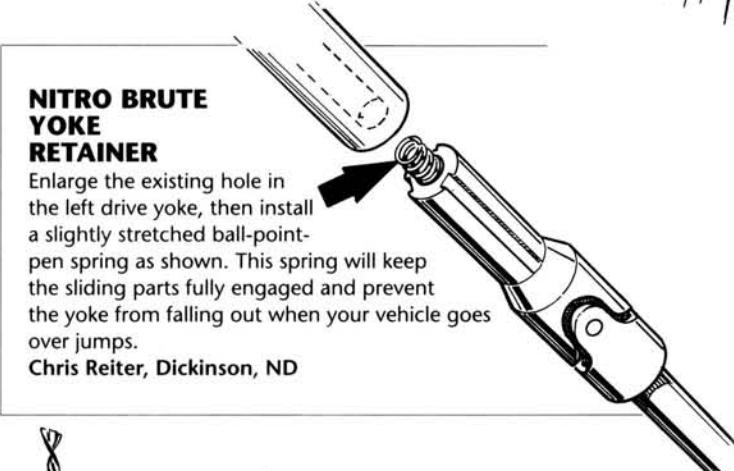
Paul Bayley, Urbana, IL



E Z GRIP CLIPS

Strip the insulation off some 14-gauge wire, then slide the tubing over the loop of your body clips. The bright color will make them easy to see, and the tubing will make them easy to grip.

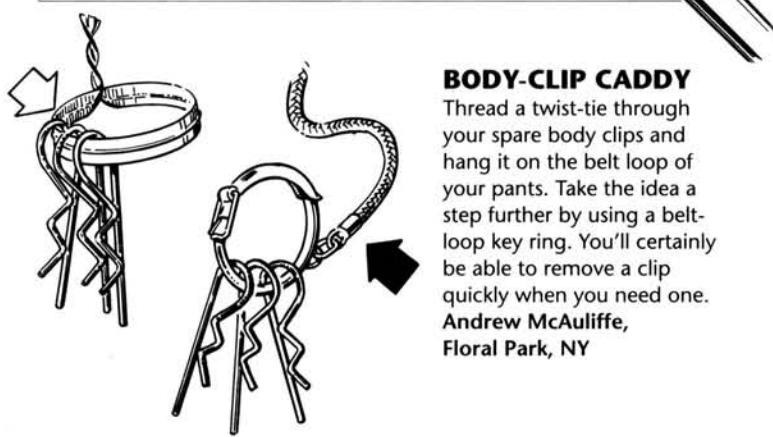
Aldo Jimenez, Spring Valley, CA



NITRO BRUTE YOKE RETAINER

Enlarge the existing hole in the left drive yoke, then install a slightly stretched ball-point-pen spring as shown. This spring will keep the sliding parts fully engaged and prevent the yoke from falling out when your vehicle goes over jumps.

Chris Reiter, Dickinson, ND



BODY-CLIP CADDY

Thread a twist-tie through your spare body clips and hang it on the belt loop of your pants. Take the idea a step further by using a belt-loop key ring. You'll certainly be able to remove a clip quickly when you need one.

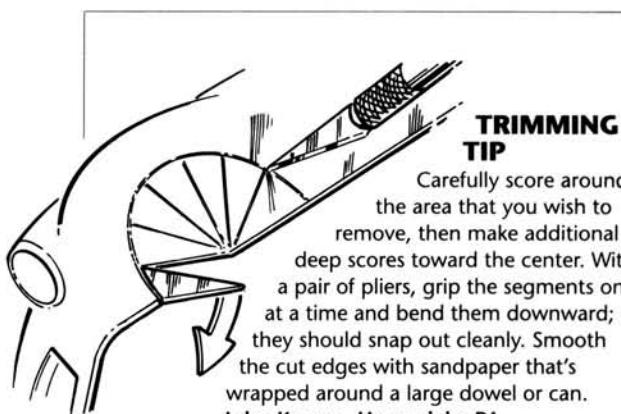
Andrew McAuliffe,
Floral Park, NY



TIRE-TRIMMER STICK

Glue 60- or 80-grit sandpaper to both sides of a wooden paint stirrer and you'll have a useful tool for truing tires. The stirrers are usually free at your local paint store.

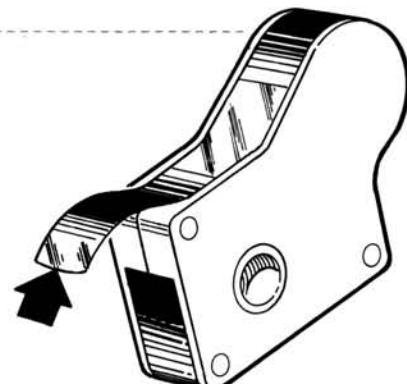
Butch Thompson, Racine, WI



TRIMMING TIP

Carefully score around the area that you wish to remove, then make additional deep scores toward the center. With a pair of pliers, grip the segments one at a time and bend them downward; they should snap out cleanly. Smooth the cut edges with sandpaper that's wrapped around a large dowel or can.

John Kresge, Honesdale, PA



JRX-PRO GEARBOX SEAL

Keep dirt and water out of your gearbox, and prolong the life of your gears and bearings by wrapping a turn or two of vinyl electrical tape around the gearbox seam.

Tyler Holowatch, Sherwood Park,
Alberta, Canada



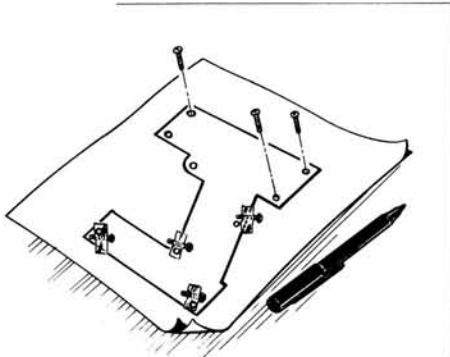
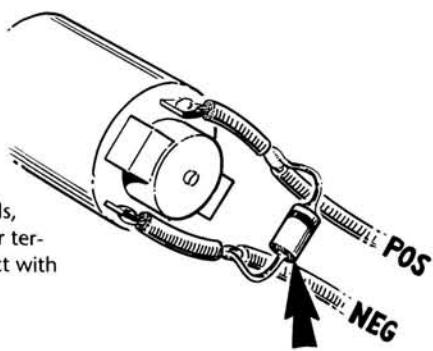
PIT TIPS

(Continued from page 30)

PERMANENT SCHOTTKY DIODE PLACEMENT

Instead of un-soldering the diode every time you change motors, solder it to the motor leads, approximately 1/2 inch (13mm) from the motor terminals. Be sure that the diode polarity is correct with respect to the positive and negative leads.

Kevin Vendeville, Stalwart, MI



SCREW PLACEMENT JIG

When you're removing screws from a part and they're of different lengths, make a rough drawing of the part and tape each screw next to its hole on the drawing. You could also draw the part on cardboard and pierce the screws into the appropriate positions.

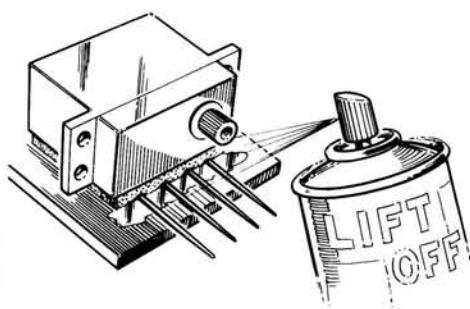
Paul Funk, Racine, WI



HOMEMADE SNOW TIRES

Give your worn-out tires new life as snow tires by adding hot-glue ribs, as shown.

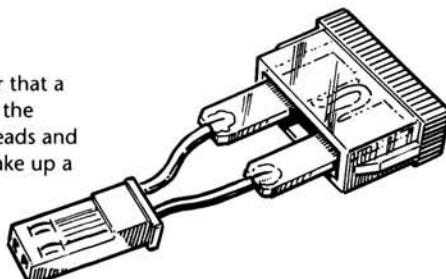
Mike Simo, Appleton, WI



FREEING SERVO TAPE

To remove a servo that's mounted with tape, push toothpicks under the tape and spray it with Lift Off (available at hardware stores). The liquid runs under the tape to dissolve the adhesive and, after a few seconds, you can peel off the servo.

Jerry Dotson, Puyallup, WA



TEKIN REPLACEMENT FUSE

Many radios come with a 4-cell holder that a lot of racers do not use, so just cut off the female plug, solder a fuse across the leads and plug it in. If you can get the plugs, make up a few spares.

Steve Carter, Turlock, CA

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o **Radio Control Car Action**, 251 Danbury Rd, Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material. PLEASE NOTE: Be sure to print your name and full address clearly on every letter and sketch you to send to Pit Tips. We can't publish many good tips because we don't have the senders name or address.

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NEW! D016 TORNADO II™ Racing Truck Body for Narrow Super Speedway Cars. Super Aerodynamics! Flat Bed, 2" Spoiler, & Grill Decal! Also fits Tamiya Toyota Prerunner, Chevy S-10, Clodbuster, Parma Hemi Vette & Coupe!



NEW! D017 TORNADO II™ High Performance Racing Truck Body for Standard Width Cars like the RC10L. Features Flat Bed, 2" Rear Spoiler & Truck Grill Decal!



NEW! D020 M3 EXTREME™ Super Handling, Highly Detailed, Touring Sedan Body with Wing for Tamiya Sedans.

NEW! D021 M3 EXTREME™ Fits Serpent, BMT 931, Parsec, & Delta.



NEW! D012 F-1 FIGHTER™ Super Low, Formula One Racing Body with Fighter Wing™. Fits RC10L & RC10LSS.

NEW! D011 FIGHTER WING™ Bi-Level Wing Great for F-1 & Dune Buggies!

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Shootin' fuel

There are several ways to refuel your car or truck when the tank gets low. You can raid the kitchen and ruin a turkey baster, or you can do it right and use a fuel bottle or gun. If you're just running around for fun, you don't need a lightning-fast fuel gun, but if you race, you might.

Fuel bottles are just that—bottles. They're usually just a plastic bottle with a plastic or metal spout that makes filling easier. The problem with them is that it's easy to fill too fast and, if you do, you end up dousing your entire chassis with fuel. If some of that fuel ends up in a servo or your receiver, you might want to be prepared to chase your car as it screams down the road out of control.

FUEL GUNS

"dump" fuel into the tank without you having to squeeze a bottle, and most stop filling the tank when it's full. Dynamite* has just released a good, inexpensive fuel gun they call the Thunder Shot Fuel Filler. It's made of plastic and has

a capacity of 125cc (one $\frac{1}{8}$ -scale tank or almost two $\frac{1}{10}$ -scale tanks). Pull out the small plug on the top of the filler and fill the unit with fuel (a fuel bottle helps here). When you're ready to fill your tank, simply insert the tip of the filler into the tank and squeeze the handle. As the fuel flows out of the filler, air enters through a vent

tube. When the tank is full, the vent tube is shut off and the fuel flow stops—no spills! Just release the handle, and you're ready for another tankful of fun. And, best of all, the filler costs less than 20 bucks!

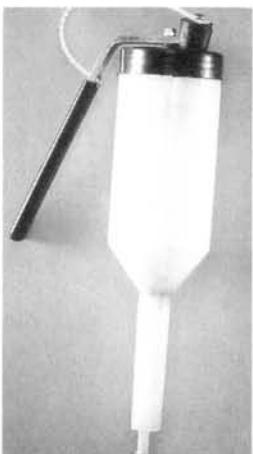
If you really want to get a totally trick-looking fuel gun, check out DuraTrax's* new Automatic Fuel Gun. The DuraTrax gun works in the same way as the Dynamite gun, but it's much more solid because it's made of aluminum tube. It's called a gun because of its shape and because it has a trigger to dispense the fuel. To add fuel to the gun, you remove a small O-ring-sealed aluminum plug on the back end of the unit (again, a fuel bottle helps here). Three tubes run from the filling tip to the top of the fuel chamber to allow air to enter as fuel exits. As with the Dynamite fueler, fuel rising in the tank shuts off the fuel flow. Because the gun is made of aluminum, you can't see the fuel that remains inside, so a piece of fuel tubing that runs along the side of the gun shows you. The DuraTrax unit is very beefy and trick-looking, but it costs about 45 bucks.

The new .12 on the scene is from Thunder Tiger. It's available with or without a pull-starter.

start to a full-blown version with a heat-sink head. Versions are also available with a cut shaft for the RC10GT and with a Serpent/Picco-type shaft. All engines have ball-bearing-supported crankshafts and a rotary-type carb. As on the Dynamite engine, the carb is held in place with a pinch-type bolt rather than a pair of screws, so it can be rotated to fit a particular car.

Although the engines are designed with the same mount and exhaust fittings as those on the O.S. CZ, there are some internal differences. On the pull-start versions, the one-way bearing is inside the crankcase (it's outside on the CZ). This allows fuel and oil to keep it well-lubricated so it won't become gummed-up and seize.

Despite the ABC logo on the outside of the engine's box, they use a nickel-plated sleeve. I talked to Thunder Tiger about this and they assured me that the nickel plating is thicker than the plating used on most other .12s, so it will last longer. Only time will tell.



Dynamite's fuel gun is a simple design that works well. Best of all, it's not very expensive, and it has an auto cutoff feature, so you won't douse your chassis with fuel.

HOT NEW .12

A new .12 engine has hit the market. Thunder Tiger* USA has just released the PRO-12 engine. It's available in several configurations, ranging from a non-pull

The DuraTrax Automatic Fuel Gun is very beefy and works well. The tube on the side shows you how much fuel is in the gun.



NITRO Q&A

Q I've had a Kyosho Nitro Thrasher for about a year now, and since that time, I don't think I've ever been able to run a single tank of fuel through it without it stalling at least once or twice. It's pretty much always been hard to start, and I think the problem might be my tuning of the engine. I never knew what the idle-mixture screw was until about 3 or 4 months ago, and I've gotten it so out of whack that I'm completely lost. The CZ-R engine is completely stock, and the fuel is 10-percent nitro and probably meant for airplane use. (I was told it was an all-purpose fuel.)

What I need to know is what the factory setting for the idle mixture screw is, and if you can use airplane fuel in this engine. Because I don't live anywhere near a hobby shop that sells car fuel, and I can't order it from the U.S., can I use airplane fuel?

*Jeff Chase
Saskatchewan, Canada*

A Jeff, I called Dave Sproul of Great Planes to see what you should do to get the engine back in tune. The first step is to turn the low-end screw in just until it's snug. Don't turn it too much, or you could damage the needle. Now turn the needle out to one-and-a-half turns as a starting point. Turn the main needle to two turns out. These settings should get the engine fired up so you can do further tuning. My next suggestion is to look at an article I did in the April '94 issue called "Basic Engine Tuning." In that article, I covered all the things you need to know to get it tuned correctly. The airplane fuel you're using should work fine, but you might want to try some 20-percent nitro; and keep pestering your hobby shop to get some car fuel!

Got a question about gas?

Send your letters to Nitro Q&A, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897.

* Addresses are listed alphabetically in the Index of Manufacturers on page 157. ■

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RC10GT



COMBO: 12PULL START ENG & FUTABA 2CH PISTOL \$319.95

MICRO RACING

CORSAIR 1/8 4WD



COMBO: 21 RE ENG & FUTABA 2CH PISTOL \$669.95

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IMPACT #8030 1/10 .15ENG



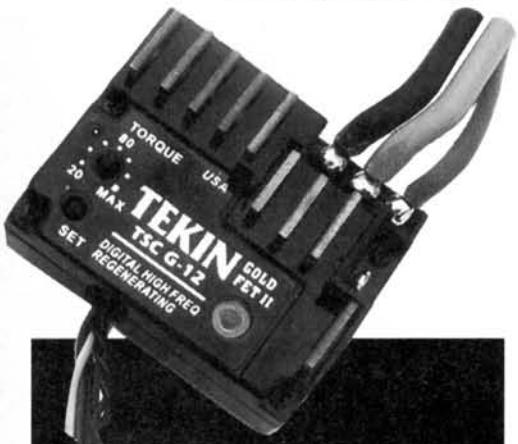
COMBO: 2CH FUTABA RADIO \$419.95

Returns may be subject to some RESTOCKING fee. Shipping charges are non-refundable. All prices subject to change without notice. Defective, missing, or broken items are handled by the manufacturer. NO returns without prior authorization.



Tekin TSC G-12

THE ERA OF one-button electronic speed control (ESC) programming has arrived! And Tekin has jumped into the fray in a big way with their TSC G-12—a racing-style ESC (forward and brakes; no reverse). It replaces their top-of-the-line TSC 411G2, which has been used to win many international and national races. When a company replaces a controller of this caliber with a new model, you can bet that the new model is real a barn-burner. Let's check it out.



What it Has

- Very low resistance.
 - High-frequency motor control.
 - QuickTUNE™, one-button matching to the transmitter.
 - Throttle Priority Circuit to guarantee full bottom-end power.
 - Current-limiting adjustment knob with test point.
 - Massive—12AWG—motor leads and battery leads.
 - BEC with on/off switch.
 - Built-in 32A Schottky diode.
 - Torque control.
 - Reverse-polarity protection.
 - Automatic thermal cut-off.
- And, of course, it comes with a hot decal sheet, tie-wraps, heat sinks, mounting tape, interchangeable receiver plugs, motor capacitors, Deans Ultra Plug, red battery-to-motor wire and an instruction book with a "service return" card.

TREAT FROM TEKIN?

The instruction book is one of the best in the industry—excellent photography and illustrations (a picture is worth a 1,000 words) and a detailed description of how to set up the ESC with the most popular transmitters.

To check inside, I removed the four screws that held the bottom half in place. (The bottom is flat and smooth—good for mounting.) You can also remove the TSC G-12 from its case without prying the unit loose from its double-sided mounting tape. This is a handy feature if you run in dust and/or get things wet and need to clean out the case without detaching the entire ESC. The case's top half is trapped by the solder-link fuse and the motor and battery wire posts.

An amazing amount of 21st-century electronics is crammed into a relatively small space, and the quality looks extremely good, but how would it stand up to my "Scoping Out" lab tests?

With its one-button setup, installing the TSC G-12 on my test-bench equipment was easy. While testing an ESC, I operate it with a servo driver called a Pit Stop radio; it's a box with a knob on top that puts out the signal needed to drive a servo or a speed controller without the use of the transmitter. With everything wired up, I pressed the TSC G-12's program button for 5 seconds (its pulse-checking LED starts to blink when the TSC G-12 is ready for programming), and then rotated the knob on the radio—first full forward, then full brakes and, finally, back to neutral. When the LED stopped blinking, I knew the TSC

G-12 had been programmed—matched to my radio.

But I like a little more room between the point at which the speed control is on at full throttle and the radio knob is at full travel; so I reprogrammed the TSC G-12, this time turning the radio knob only to about 80 percent of full throttle. This gave me the 20 percent of "over-travel" that I like my throttle to have.

TEST 1—RESISTANCE

This is the most important test of a racing ESC because low resistance means the ESC will be able to handle a hot-wind modified motor without robbing it of power or running hot.

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

- Voltage drop along the full length of the battery and motor wires: 0.05 volt—a resistance of 0.0041 ohm.

- Voltage drop 2 inches along the battery and motor wires: 0.03 volt—an amazingly low resistance of 0.0025 ohm.

The TSC G-12 is right up there with the best of the best; some ESCs have done as well as this, but none was better. These

low resistance readings guarantee that the TSC G-12 will be able to handle some very hot motors without overheating.

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. The heat sinks are in place, but there's no cooling air.

I let the TSC G-12 run for 15 minutes—the equivalent of dumping three or four battery packs without any cooling-off periods. After 15 minutes, the TSC G-12 was still so cool that I checked my current meter to make sure that I had increased the current enough. But then I realized that this was what I could expect of a high-quality ESC with really low resistance readings.

TEST 3—HANDLING A SHORT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. I short the motor leads while the ESC is fully turned on. The current jumps to 40 amps.

Caution: a 6-, 7-, or 8-cell pack can deliver more than 100 amps when shorted, so if your buggy won't go, turn it off and find the cause of the trouble. Holding the pedal to the metal till the smoke rolls may well burn a hole in your wallet. (The best auto cut-off is your brain attached to your finger.)

After 1 minute, the heat sinks were starting to warm up, but they were

(Continued on page 43)

*(Continued from page 38)*

by no means hot. The TSC G-12 will easily handle twin-motor vehicles such as MRC's World Scale trucks and buggies.

INSTALLATION

I was ready to install the TSC G-12 in my RC10 to see whether it would work as well in a car as it had on the test bench. I had two goals:

- I wanted to cure the

glitching I had been experiencing.

- I wanted raw power.

I mounted the receiver on the shock tower, making sure that the antenna wire went straight up from it (never run the antenna along a metal or graphite chassis). I moved the antenna from the middle of the chassis to the top of the shock tower so that it exited straight up and away from noise-generating components.

The ideal position for the TSC G-12 seemed to be on the chassis right next to the battery pack and as far back as possible (close to the motor). This meant that the battery wires and motor wires were sticking out to the side and were getting in the way of the battery pack. But this wasn't a major problem with the TSC G-12 because its battery and motor wires are replaceable. I simply unsoldered them from the gold posts and reattached them so that they stuck straight up.

To finish the installation, I added a Lite Speed connector for the battery and I hard-wired the motor. This job was made very easy by the excellent instruction book.

TRANSMITTER MATCHING

A simple push of the QuickTUNE™ button and a swish of the trigger, and the TSC G-12 was matched to my radio. I stopped forward trigger travel at the 90-percent point; this gave me very smooth throttle response over the entire throttle range and guaranteed full "on" when I put the pedal to the metal.

READY TO ROLL

I headed to the local track with several battery packs. I have a Trinity 13-

turn double in my RC10; the gearing is set to dump a 1400mAh pack in about 5 minutes.

I started with the current limit set at 80 amps—the recommended setting. The car exploded around the track with great acceleration, yet the TSC G-12 provided a controllable "soft touch" for taking the corners.

I ran the first battery pack to a complete dump to see how the controller would behave. I suspect that a feature that Tekin calls a Throttle Priority Circuit (TPC) comes into play as the battery pack runs down. Tekin says that it "guarantees full bottom-end power," and the car did, in fact, seem to have more zip left than one might expect from a dying pack. Then the car stopped dead in its tracks, but the TPC had provided usable speed and steering right up until the battery died.

During subsequent runs, I tried various current-limit settings. At the minimum setting, even your great-grandfather could have driven the car; acceleration had died and so had top speed. At the maximum setting, the car was back to normal—blinding acceleration and speed. It's interesting that at the max setting and the 80A setting (approximately the midpoint on your dial) the car seemed to "drive" the same. It's reasonable to assume that, as the instruction book explains, the extra current that flows when the current limit is set to maximum will reduce run time without improving performance.

I checked the numbers on the current-knob's dial against readings taken with my digital voltmeter and found that the dial is pretty accurate. If you

need more punch out of the turns, crank the dial up a little. If you need to calm things down because the track is slippery, crank the dial down. The best setting will always be the one that you find by trial and error along with practice and more practice.

The TSC G-12 has awesome brakes—awesome, but not uncontrollable. Move the trigger a little, and the brakes are soft, but if you slam them, they'll make the back wheels slide. Also, I can soften them with the ATV low-pot adjustment on my Futaba Magnum AM radio.

Throughout the tests, I kept a close watch on the heat sinks; I didn't expect the FETs to overheat, and they didn't. This ESC can handle multi-motors without overheating, especially if you keep the heat sinks in place and mount the ESC where it will be cooled by air passing over it.

CONCLUSION

The TSC G-12 is probably as good as it gets. The test results were all very impressive. A resistance of 0.0025 ohm is always notable, but I was most impressed by the absence of overheating during Test 2. The TSC G-12 was a joy to install in my car. The QuickTUNE™ setup took all the hassle out of getting things right. And best of all, the TSC G-12 offers excellent drivability. Low resistance; high-frequency motor drive; strong, yet controllable brakes; the TSC G-12 is sure to wind up in the winners' circle at major races the world over.

*Addresses are listed alphabetically in the Index of Manufacturers on page 157. ■

Tekin TSC G-12

DIMENSIONS

Height	0.82 in.
Width	1.45 in.
Length	1.75 in.
Weight with wires	2.2 oz.

TUNING

Access to controls	Good
Ease of adjustment	Excellent

LIST PRICE/ WARRANTY	\$199 / 120 days
-------------------------	------------------

MANUFACTURER'S SPECS

Max. voltage	15 volts (12 cells)
Min. voltage	5 volts (4 cells)
Max. current	Not listed
Continuous current	350 amps
Resistance	0.00125 ohm

TEST RESULTS

Voltage	6 volts
Current	12 amps

• Voltage Drop

—along length of battery and motor wires	0.05 volt
—2 inches along wires	0.03 volt

• Calculated resistance*

—along length of battery and motor wires	0.0041 ohm
—2 inches along wires	0.0025 ohm
BEC voltage, 6-cell pack	5.85 volts

*Resistance = Voltage drop ÷ current

COMMENTS: the TSC G-12 is probably as good as it can be: world-class low resistance; high-frequency motor drive; adjustable current limiter; super-strong brakes; and one-button (QuickTUNE™) matching with your transmitter. The TSC G-12 is small enough to fit a 1/12-scale pan car, but it's strong enough to handle multiple-motor monster trucks. It's headed for the winners' circle at major races everywhere.



Electric 101

PEOPLE TYPICALLY get into R/C cars by starting with an electric model. Of the R/C vehicles sold in America, most are the battery-powered type.

There are many reasons for the popularity of electric-powered R/C cars: they run on DC (direct current)—a very clean source of propulsion; there are no fuels or oils to mess with; they're straightforward and fairly easy to assemble. (Some don't even need to be assembled; they come built. But I think half the fun of R/C is building.)

Because electric cars and trucks don't burn fuel, they can be run indoors, and that makes them very popular during the winter. Also, the variety of electric vehicles is vast. There are on- and off-road cars and trucks, monster trucks, Formula

1 racers; well, you get the picture.

Because the market is so big, parts are readily available, and the vehicles are relatively inexpensive. You can buy a very good off-road car for \$110 to \$150—even less, if you're willing to shop around. The kit may even include a motor and mechanical speed control.

To get into electric-powered R/C you'll need: an R/C vehicle; a motor and a speed control (which might be included in the kit); a radio; batteries for the radio; a battery pack for the car; a battery charger for the car's battery pack; motor cleaner; paint for the Lexan body; bearing or bushing oil lubricant; and a commutator (comm) stick for cleaning the motor's armature.

KITS

When shopping for an R/C car or truck, be sure to check out the available combo deals. They're a great way to pick up everything you need in one shot, and they sometimes include cars that are already built.

If you purchase an R/C car in kit form, you will probably need some common hand tools, such as a small flat-head screwdriver, a small Phillips screwdriver, needle-nose pliers, an X-Acto knife and maybe a set of small hex wrenches (some kits supply these).

Try to buy an R/C car or truck that your hobby shop supports; make sure your hobby dealer either stocks the parts or can get them quickly. There's no sense in owning a car that can't be repaired in a reasonable time.

Some electric kits come with a motor and speed control. If yours doesn't, then obviously you need to buy them,

and there are a ton to choose from. When purchasing a motor, your best bet is to select a good 24-degree stock motor. They're relatively inexpensive and they're equipped with bushings instead of bearings; they also provide enough power for beginners as well as more seasoned drivers.

The best way to control the power going to the motor is with an electronic speed control (ESC), if you can afford one. A mechanical speed control costs about \$20; a good budget ESC costs anywhere from \$50 to \$80, but it delivers the power very smoothly and never wears out because it has no moving parts. It will also produce longer run times and faster speeds. If you choose to buy an ESC, go with a sport-type such as the Novak* 410 M5, Tekin* TSC-408S, or SCI* Viper.

Is there a special type of paint that I need to use on the body?

Yes! Only use a paint that's made for Lexan and polycarbonate materials. Any other paint will give you great results at first, but the first accident will produce tons of paint chips. I use Pactra* Racing Finish spray paints.



What can I use to clean my car?

Compressed air works well. Also, any electric-motor cleaner designed to clean R/C car motors will work well; Trinity*, Point Blank*, Reedy* and Dynamite* make good cleaners. Before dowsing the car with cleaner, always test it on a small area first; some cleaners will eat plastic and nylon.

Can I use any oil I want in my shocks?

No. Most kits supply you with a shock oil that's suited to the application. For the best results, use 100-percent-silicone oil; but if you do, use it before you use the kit's oil, because the kit's oil won't be silicone unless it's specified, and silicone oil doesn't mix with regular shock oils. Associated*, Trinity, Team Losi* and others offer silicone oils in many different weights.



Are bearings worth the extra money when you buy an R/C kit?

Yes. I recommend two things for every R/C vehicle: bearings and titanium tie rods.

Bearings last longer than bushings and increase run time and speed. In off-road cars, the first parts to bend and break are the tie rods; titanium tie rods are twice as strong as steel rods and about a third their weight.

Team NOVAK

TEAM SECRETS

What Does it Mean—Sport?

Before I go any further, let me clear up what "sport" means. When you see a sport radio, a sport battery pack, or even a sport speed control, you see equipment that's perfect for use in the yard, or parking lots, or anywhere you're just playing around. Sport equipment is designed for the sport enthusiast—not the racing enthusiast. It can be used for racing, but it just isn't quite as good as full-blown racing gear, and it's not nearly as expensive.

SPORT EQUIPMENT

When it's time to buy a radio, any good sport radio will do. The Futaba* Magnum sport, Airtronics* Rival and JR* Propo Python are great beginner radios; they use the AM radio band to transport the signals to the car's receiver.

Again, the word "sport" comes to mind when considering battery packs. If you plan to run $\frac{1}{10}$ -scale on- or off-road, I suggest that you use 1400mAh 6-cell battery packs. Almost all battery

packs you see will be made by Sanyo or Panasonic. Stay away from the more expensive cells for now. Batteries that are matched and pushed are for racers who need that little extra edge. A beginner would hardly notice the difference between a sport pack and a pushed pack.

OTHER NECESSITIES

Any 15-minute battery charger for Ni-Cd batteries will work well. They're made by Pro-Tech*, Tower Hobbies* and Hobbico*.

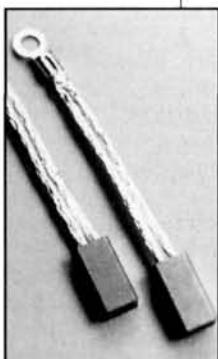
If you can afford it, a peak-charger, which automatically charges the battery to full capacity then shuts off to prevent overcharging, would be the next step up. The companies already mentioned make excellent peak-charging devices, as do Tekin and Novak.

For the proper maintenance of your car, you'll need a few additional items, such as motor spray to clean the motor bushings or bearings and brushes. You can also use the motor spray to clean the bushings and bearings in the car. Any good bearing or bushing oil should be used to lubricate the bushings or bearings after cleaning them. You'll also need a comm stick to clean the motor's commutator. Clean lines ensure better contact between the comm and the brushes, and that means longer run times and more power.

How will I know when it's time to change the brushes on my electric motor?

You will see a decrease in power and will probably experience glitches. As the brush wears, it gets shorter; this makes it hard for the springs to hold the brush down on the armature. When this happens, the brush will start to bounce off the armature and create an arc, which will eventually ruin your armature and cause havoc with the other electronics.

Change the brushes as soon as you notice a drop in performance. You should change the springs at the same time because the heat from the motor weakens them.



Should I buy a used R/C car to start with?

That's always a good option, but be sure to take somebody with you who has a lot of R/C experience. Sometimes it's more expensive to fix up a used R/C car than it is to buy a brand-new one.

What style of R/C vehicle should I start with?

If you don't have a preference for either on- or off-road, then I suggest that you buy a $\frac{1}{10}$ -scale, 2WD, off-road electric car or truck. You'll be able to run it in many more places than an on-road, mainly because of its great ground clearance and massive suspension components. Off-road R/Cs are very rugged and can take a lot of abuse, and if you ever want to run on-road, just change the tires from spikes to slicks.

*Addresses are listed alphabetically in the Index of Manufacturers on page 157. ■

GOING FORWARD

Last month we looked at the differences between forward-only and reversible ESCs. We also reviewed our line of reversibles. This month, we will look at our new line of forward-only One-Touch ESCs.

One-Touch and we gotcha! Our new line of ESCs feature **One-Touch Set-Up™** which makes adjusting your ESC to your transmitter as easy as pushing a button. Also included is our all new **Radio Priority Circuitry™** to maintain complete steering servo control, even after the batteries have dumped. Novak's **Digital Anti-Glitch Circuitry™** is also included in our new ESCs to filter out radio interference.

DUSTER SPORT

At the sport level, the **Duster** is replacing our legendary 410-M5. Like the M5, the Duster is designed for the entry level racer at an economical price. Although the Duster has the same voltage drop at full throttle as the M5, the transistor switching speed has been increased for higher efficiency.



RACER

At the competition level, the new **Racer** is replacing both our 410-M1 and 410-M1c.



Designed for competition racing, the Racer features our new **CLC II Current Limiter** which is designed to be faster and smoother than any other current limiter. The CLC II also has an expanded setting range from 20 to 80 amps, and an OFF position for unlimited punch.

HAMMER PRO

At the professional level, the new **Hammer Pro** joins our five-time World Champion

410-HPC. Like the HPC, the Hammer Pro uses HYPERFET transistors for the lowest voltage drop. The Hammer Pro also incorporates the new CLC II Current Limiter. When it comes to performance, the Hammer Pro is second to none!

Team Novak welcomes your comments and secrets!

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ADVERTISEMENT



Doc's Toy

If it shows up at your parking lot....you've lost

FOR YEARS, I've been interested in street cars and parking-lot cars. I love to race, and I started out just banging around the local church parking lot by myself or with other guys who showed up from time to time. Parking-lot racing is really starting to catch on again, and one of the things I like about it is the "run what you brung" mentality of the participants and the organizers.

A lot of high-zoot hardware is being sold these days, but very little of it ever makes it to the race track. Where is it all going? I'd guess that a lot of folks are setting up and playing with some seriously fast, electric, on-road hardware on the street or in the parking lot.

With that in mind, I decided to put together my own expression of pavement-pounding pulchritude. Using some parts I had in the toolbox and a recent copy of *Radio Control Car Action* (hey, where would you

find better ads?), I ended up with a collection of pieces that, when assembled, would represent the state of the art in 4WD parking-lot mayhem.

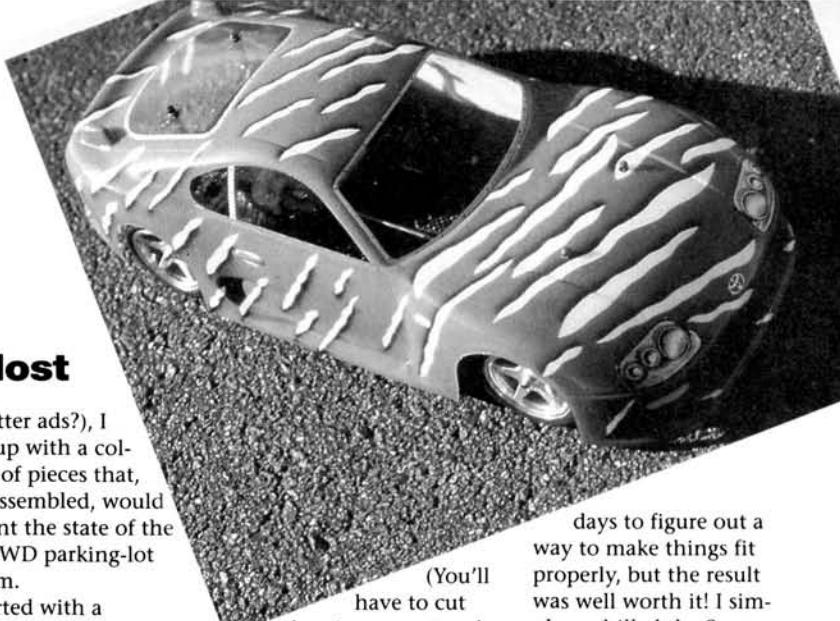
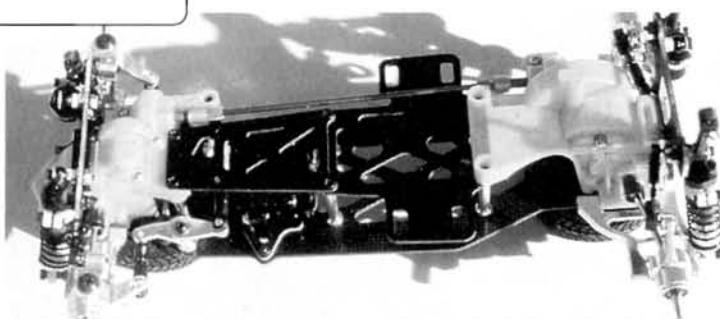
I started with a Tamiya* 4WD sedan kit that had a TA02 chassis, because it can take the beating from a high-powered motor without breaking down. On the other hand, the precision of the chassis and suspension leaves a lot to be desired. It's not unusual to be able to take a newly assembled rolling chassis and move the suspension arms and shocks around very easily. That's fine when you're using a hot stock or a mild modified motor, but I had bigger things in mind!

To the basic kit transmissions, which I built using Tamiya's ball-bearing set with lightweight shafts (no. 53167), I added Tamiya's heavy-duty propeller shaft (no. 53152). This combination gave me a reliable drive system.

I mounted the trannies on an HPI* (no. 8020) graphite chassis set, which includes both upper and lower decks for maximum rigidity. These pieces are attached to a single graphite plate.



Above: the Tamiya transmissions can be bolted to the HPI graphite chassis plates with little fuss. It's a solid combination! **Below:** all that aluminum, chrome and graphite sure is striking!



(You'll have to cut the pieces apart and either sand or file down the connection points.) I did have to shave the small rear spacer down to half its height where the screws pass through so that everything lined up properly without placing stress on the mounting points. Aside from that, everything fit perfectly. I also used HPI lowering kits: (no. 6400) rear and (no. 6410) front. They replace the kit bulkheads and bring the car's ride height down a little without my having to shorten the shock travel too much.

At this point, I spoke to the folks at Hobby Etc.*, who had just received a shipment of new aluminum GPM* parts for the Tamiya TA02 chassis. Within days, UPS brought me a complete set of GPM machined-aluminum suspension arms (TCV55 front/TCV56 rear) and knuckles (no. MDO22 rear/MTO21 front). They had also sent along a machined-aluminum front gearbox hatch (no. MDO12).

When I first put the arms onto the mounting ears, they were looser than the original plastic parts! Plus, the kit's hinge pins wouldn't fit all the way in, because they were intended to be screwed into plastic arms using the self-tapping threads on the end.

It took me a couple of

days to figure out a way to make things fit properly, but the result was well worth it! I simply re-drilled the 3mm holes in the arms, knuckles and uprights for $\frac{1}{8}$ -inch Associated* RC10 hinge pins that I had in my toolbox. To capture the hinge pins, I drilled and tapped small 4/40 holes in the suspension arms and used setscrews that were tightened against flat spots filed on the pins. I was also able to fit the arms and knuckles together very precisely using a file and some small motor washers. Then I installed the GPM front uprights (no. MDO20), which use 5x8mm bearings to ensure smooth, easy action.

A SHOCKING DISCOVERY

At this point, I was looking at lots o' shocks. Tamiya makes a good set of aluminum body shocks, but I opted for what I consider to be some of the best shocks in all of R/C—Associated Team Shocks. I used the short set (no. 6434) and put them together with 10mm spacers that I had cut out of silicone fuel tubing and slid onto the shock shafts under the piston.

The 80W Associated silicone shock fluid and Green springs all around gave me a good starting point for suspension tuning. If I need more grip, I can use lighter shock fluid and Black springs. I

can respond to high-traction surfaces with firmer silver springs.

The shocks were mounted on the bottom end in the outside hole in the arms with 3mm cap screws that I had trimmed to 12mm in length. I used standard Associated 4/40 screws and locknuts to secure the upper ends to the upper holes in the HPI lowering kits. The front arms sit just a little higher than straight across, and the rears just a little lower. That gives the chassis the right stance for proper handling.

Because I wanted to

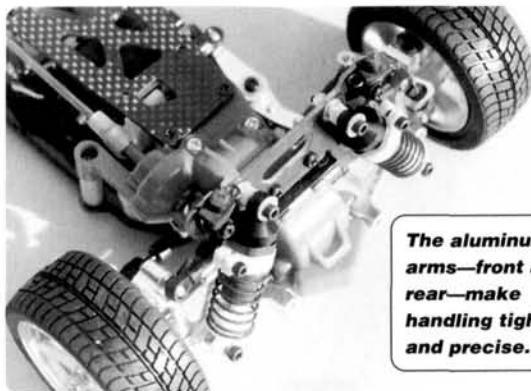
up front and super-wide radials (no. 4511) in the back. They were mounted on HPI chrome-plated wheels: no. 3554 in the front and no. 3566 in the rear. It was easy to slide them on after I had sanded off the chrome plating on the inside of the rim edge. I used CA to attach them firmly to both inside and outside edges. Unlike Tamiya rims, the HPI pieces don't have an inside rim bead, so be extra careful here!

Because I had settled on an HPI Toyota Supra body (no. 7013), I also decided to use their alu-

minum Speedy. He was kind enough to lay down the color for me. The body set came with a small sheet of detailing decals, and the result is truly striking. You won't see another one like it! You'll also notice in the pictures that the rear wing is missing. I attached the wing for the first set of driving tests, but the chassis handles so well that it doesn't seem to need a rear wing, so I took it off. I'll save it to use on low-traction surfaces.

To test the car, I drove out to a deserted parking lot on the far end of an industrial park. I wanted clean, fresh asphalt and no traffic! The first motor I put in was a 15-turn Kisbey Super Stock motor from HPI. From the moment I hit the throttle, I knew that the project was a success! I've never owned a car that was easier to set up and drive and that balanced traction and response so well.

After running a couple of battery packs through the car and experimenting with different springs and gearing, I started to pump up the power. I went right for the big stuff, and put in a 12-turn, double-modified motor I had been saving for the occasion. I also used GPM's motor heat sink (no. TCV01), which is attached to the outside of the gearbox case and their MD002M motor plate, which allows you to use up to a 24-tooth metric pinion with the 74-tooth spur gear that comes with the kit. Hot stuff!



The aluminum arms—front and rear—make handling tight and precise.

experiment with different caster settings, I made up a complete set of adjustable upper links using 3mm Tamiya ball ends and 4/40 Associated turnbuckles. It's not as tightly fitting as I would have liked, but it will have to do for now. I also installed GPM's excellent ball-bearing steering linkage (no. MDO48) for a silky feel you just can't get with the parts from the kit.

When it was time to mount up some rubber, I went straight back to HPI. I knew from conversations with Kent Clausen that HPI's radial rubber was the best bet for high traction and long wear on pavement. I used the long-life tires (no. 5130)

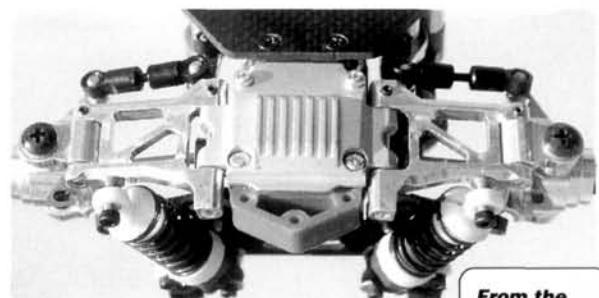
minimum hubs (no. 6116). They come with nifty, hardened roll pins that don't fall out when you take the wheels off like the ones in the kit do. I also opted for a set of their hub washers that extend the track about 2.5mm on each side. The wider track makes the car handle better and, because the body is a little wider than most sedan bodies, it looks better, too.

Speaking of the body, I had decided that I wanted something that would really stand out in a crowd. I don't use an airbrush, but I designed and masked the body, mixed the turquoise paint and took it to my good friend Tommy "Boom Boom" Hernandez at Hobby



Note the ball-bearing steering linkage, adjustable upper links and ball-bearing-supported kingpins. Sweet!

This time, the car was absolutely ballistic! Straight-line tracking was dead-on (something I'd always had trouble with at top speed using kit parts), and high-speed, four-wheel drifts were a snap. Out of curiosity, I asked a buddy to drive his car up and down the street to see if the Supra could catch it. He was a little tentative at first, but he eventually got the hang of it as I kept passing him after 100 feet or so. The Supra's top speed in this configuration seems to be around 45mph with a fresh 6-cell 1700 SCRC pack. Try that



From the bottom, you can see the setscrews for the oversized Associated hinge pins.

with your parking-lot car, and see what happens!

All in all, I'd have to say that I'm deliriously happy with my new toy. So far, it has been able to handle as much power as I can put into it. Although I have yet to enter it in any parking-lot races, I'm sure we'll be competitive together. Isn't that what a project car is all about?

*Addresses are listed alphabetically in the Index of Manufacturers on page 157. ■

FAST MOTORS, killer batteries and trick chassis don't mean a thing if you can't control the car! Many people seem to spend more time on deciding which color screws to use than on choosing the right servo. Whether you're in the market for a new steering servo or you need a second servo to control your model's mechanical speed control or your gas engine's carburetor and brake, this Servo Guide is where you should look *before* you buy!

Here's the practical information that you need to

know before you choose a servo. How much torque is needed? How fast should the servo be? This Guide answers these questions and provides additional information on the various features and specifications of servos from all the leading manufacturers. We also include handy application information to help you to choose wisely, and the general technical information we supply will help you to understand the inner workings of these minute mechanical workhorses.

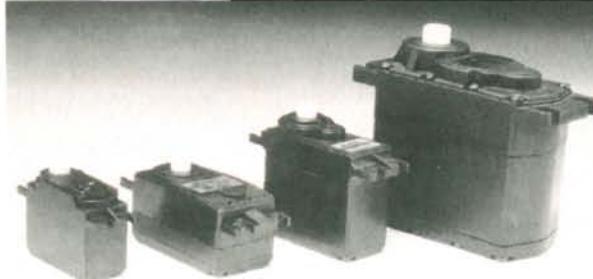
Know the facts about these electronic workhorses

by Frank Masi



RADIO CONTROL CAR ACTION Servo Selection Guide

Which Servo? When you're ready to buy, consider these factors—



Torque. How much torque do you need? This depends on the vehicle you plan to use it with. The larger the vehicle, the stronger the servos should be. • $\frac{1}{10}$ -scale off-road buggies need at least 25 oz.-in. of torque.

- $\frac{1}{10}$ -scale racing trucks need 40 oz.-in. (Most experts agree that this is the bare minimum.)
- Big trucks, e.g., Tamiya's Clod Buster, and $\frac{1}{8}$ -scale gas cars and buggies need 75 oz.-in. or more. You'll be able to get away with less powerful servos, but your vehicle won't be as stable or controllable.
- On-road cars generally need less torque, but keep in mind that a stronger steering servo will help to keep your car's tires pointed where you want them—especially at higher speeds.

Buy the most powerful servo that your wallet will allow. I don't think that you can ever have a servo that's too powerful.

Transit speed. This is critical to a servo's performance. A servo that's too fast will make your car react almost before you can, while a servo that's too slow will give only sluggish response.

A servo's speed is also a matter of taste. You know the saying, "Some like it hot"? Well, certain drivers prefer the lightning-fast response of today's "super-servos." Others like slower servos that allow them to drive smoothly and turn with nicely radius corners.

Which type of servo is for you? If you have good eyesight and very quick reflexes, you might do well with a fast servo. Very fast servos allow the car to recover more quickly from "bobbles," and you can alter driving lines with a flick of the radio's steering wheel. But a fast servo might lead those who are nervous on the drivers' stand to "over-drive" the car and make more mistakes.

Slower servos can make up for a nervous hand. They allow you to drive smooth lines around the track, but if you're in a very tight race against evenly matched competitors, you'll be at a disadvantage if you can't react quickly enough to pass—or to avoid being passed.

Case size. Some models have only a limited space for servos, so make sure that the one you plan to use will fit into your car or truck. In general, the more powerful the servo, the larger it will be.

Servo Guide

Mfr./model	Dimensions LxWxH (in.)	Weight (oz.)	Torque/transit speed oz. -in./sec. 60 deg.	Motor	Bearings	Gear type	Price
Airtronics							
94102 Heavy-Duty	1.54x0.79x1.42	1.59	50/0.22	3-pole fer.	N/A	Molded	\$34.95
94144 High-Speed	1.42x0.6x1.29	1.17	33/0.09	Coreless	Single	Metal & molded	\$79.95
94151 Pro High-Speed	1.54x0.79x1.48	1.87	75/0.08	Coreless	Dual	Metal & molded	\$129.95
94152 Pro High-Torque	1.54x0.79x1.48	2.30	105/0.12	Coreless	Dual	Metal	\$139.95
94737 High-Speed	1.54x0.79x1.38	1.95	57/0.15	Coreless	Dual	Metal & molded	\$99.95
94738 High-Torque	1.54x0.79x1.38	1.95	71/0.21	Coreless	Dual	Metal	\$79.95
94831 Mini	1.46x0.71x1.18	1.10	38/0.21	3-pole fer.	Single	Molded	\$49.95
Futaba							
S132H High Speed Mini	0.68x1.43x1.18	1.1	25/0.13	3-pole fer.	N/A	Molded	\$64.95
S148 Precision	0.77x1.59x1.41	1.5	42/0.22	3-pole fer.	N/A	Molded	\$39.95
S3001 Precision	0.77x1.59x1.41	1.6	42/0.22	3-pole fer.	Single	Molded	\$44.95
S3002	0.62x1.21x1.18	1.8	44/0.16	3-pole fer.	Single	Metal	\$99.95
S3302 1/4 Scale	1.14x2.32x1.97	3.6	110/0.19	3-pole fer.	N/A	Metal	\$99.95
S9101	0.77x1.52x1.36	1.5	41.7/0.17	Coreless	Single	Molded	\$99.95
S9303	0.79x1.59x1.55	2.3	99/0.19	Coreless	N/A	Metal	\$114.95
S9304	0.79x1.59x1.4	1.7	69.5/0.22	Coreless	Single	Molded	\$99.95
S9403	0.79x1.59x1.4	1.7	44.5/0.16	Coreless	Single	Molded	\$99.95
S9601	0.62x1.21x1.18	1.1	36.1/0.17	Coreless	Single	Metal	\$99.95
Hitec							
HS-615MG	1.6x0.8x1.5	2.12	107/0.21	3-pole fer.	Dual	Metal	\$69.95
HS-700BB	2.3x1.1x2	3.60	133/0.22	3-pole fer.	Single	Molded	\$39.95
HS-705MG	2.3x1.1x2	4.00	161/0.27	3-pole fer.	Single	Metal	\$64.95
Hobbico Command							
CS-51 Standard	1.6x0.8x1.4	1.75	42/0.19	3-pole fer.	N/A	Molded	\$17.99
CS-72 1/4 Scale	2.3x1.1x2	3.60	133/0.22	3-pole fer.	Dual	Molded	\$47.99
JR-Remote Control							
507 Standard	0.73x1.52x1.32	1.47	40.3/0.25	3-pole fer.	N/A	Molded	\$29.95
517 Standard	0.73x1.52x1.32	1.58	40.3/0.25	3-pole fer.	Single	Molded	\$39.95
4721 Ultra Torque	0.73x1.52x1.32	1.72	119.6/0.22	Coreless	Dual	Molded	\$99.95
4735 Ultra Speed Comp. Car	0.73x1.52x1.32	1.72	90/0.15	Coreless	Dual	Molded	\$99.95
3025 Ultra Speed 1/12-Scale Car	0.58x1.3x1.02	1.61	29.2/0.15	Coreless	Dual	Molded	\$79.95
605 Monster FET	1.26x2.5x2.3	4.75	139.1/0.28	Cored	Dual	Molded	\$109.95
KO-Propo							
PS-502FET	-	-	42/0.07				
PS-902FET	-	-	42/0.07				
PS-1001FET	1.59x0.79x1.46	1.8	90/0.07	Coreless	Single	Molded	\$129.95
PS-702FET	-	-	61/0.12				
PS-703FET	-	-	73/0.1				
PS-1003FET	1.59x0.79x1.46	2.2	115/0.12	Coreless	Single	Metal	\$139.95
PS-1004FET	-	-	62/0.1				
PS-1006FET	-	-	83/0.14				
Royal Products							
Maxi	2.25x2.31x1.13	3.7	112/0.22	3-pole fer.	Single	Molded	\$32.95
Standard	1.88x1.63x0.75	1.8	48.7/0.24	3-pole fer.	N/A	Molded	\$15.99
Shorty	0.69x1.63x0.75	1.4	44/0.23	3-pole fer.	N/A	Molded	\$18.95
Mini	1.44x1.44x0.69	1.1	33.5/0.16	3-pole fer.	N/A	Molded	\$24.95
Tower System 2000							
TS-51 Standard	1.6x0.8x1.4	1.75	42/0.19	3-pole fer.	N/A	Molded	\$14.99
TS-72 1/4 Scale	2.3x1.1x2	3.60	133/0.22	3-pole fer.	Dual	Molded	\$40.99

Abbreviations: Comp.—competition; fer.—standard electric motor using ferrite magnets.

Did you know that, in most cases, a servo's maximum torque isn't reached until the servo has moved significantly away from center position? In fact, maximum torque may not be reached until the servo has traveled as much as 24 degrees away from center. Because of this, feedback from the car or truck's wheels can cause the servo's position to be deflected from where you want it to be.

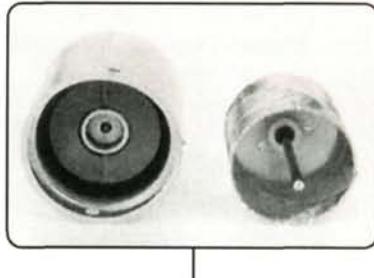
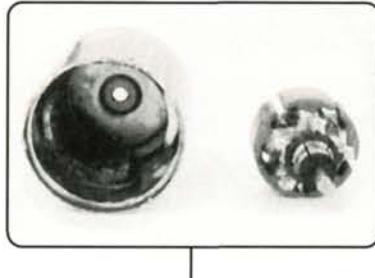
New High-Frequency Servo Technology



Enter high-frequency servo technology. Normally, the servo's amplifier cycles power to the electric motor at about 60 times per second, but with high frequency, this speeds up to about 2,200 times per second. The result is a significant increase in torque from center; in fact, maximum torque may be reached in as little as 1 degree from center. Control becomes more precise, and erratic handling as a result of servo feedback is virtually eliminated. Unfortunately, high-frequency servos consume more power than standard servos, but for many, the results are well worth it.

As of this writing, only JR Remote Control[®] offers high-frequency servos (models NES-4000 and NES-7000), which are intended for model airplanes. The NES-4000, however, with 73.7 oz.-in. of torque and a transit speed of 0.17 second, should work well for racing and monster trucks.

Servos use two common types of electric motors: cored and coreless.



Cored servo motor. This is the more conventional design. It features a central, rotating armature. An armature, in this case, consists of iron or steel plates "stacked" around the motor shaft. Conductive wire (copper) is wrapped around the segments of the stack. When current is applied to the wire, an electromagnetic field is generated, and this either repels or attracts (depending on the flow of electricity through the wire) the field of the permanent magnets of the surrounding motor can, causing the armature to spin.

Coreless servo motor.

This is like an "inside-out" cored motor in that the armature actually surrounds the permanent magnets. The conductive windings of the coreless motor are formed into the shape of a hollow tube—no stacked plates. Resin is applied to maintain the shape of the windings, which are bonded to a circular plate that holds the center shaft. The hollow armature is placed between the permanent magnets and the motor can. Similar to the cored motor, voltage applied to the windings causes an interaction between the electromagnetic field and the permanent field.

Cored and Coreless Servo Motors

ADVANTAGES

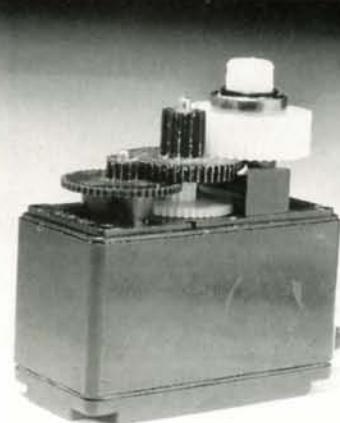
- Because of its larger diameter, the coreless motor's armature yields a larger "lever" on the motor shaft; this means more torque than a similar cored motor.
- A coreless motor has more torque and will accelerate more quickly than a cored motor. Quicker acceleration comes as a result of the lower rotating mass of the coreless motor's armature; there's less to get moving!
- Lower weight also means that the coreless motor will stop faster for better servo response and less "overshoot."

In general, coreless motors produce more torque closer to the servo's centered position. This improves the servo's ability to hold a position and to center itself.

DISADVANTAGES

- Coreless motors tend to be more expensive than cored-motor servos.
- Although early coreless servos were more prone to being damaged than cored servos (the windings sometimes fell apart when subjected to severe shocks or sustained vibration), newer materials and manufacturing techniques increase the reliability of coreless motors.

Which is Better?



For increased durability, many servos have metal gears instead of plastic ones. Unfortunately, the price of ruggedness is increased weight. Metal gears are stronger than plastic, but metal-to-metal friction can actually cause the gears to wear more quickly. As a result, metal-gear servos are more prone to backlash. In addition, metal gears can, in some cases, cause RF "noise," which will interfere with your radio signal.

Some manufacturers are addressing the shortcomings of metal-gear servos by increasing the contact area of molded gears; using a combination of plastic and metal gears; or, instead of the usual brass, using a different metal such as aluminum. As for making a choice, metal gears are still the strongest available, but plastic gears can offer greater longevity and tighter operation.

Metal VS. Molded gears

by N. DAVID BLEISCH

T

HE BAJA 500 is a punishing test of a truck's power and endurance. The full-size version of the Prerunner brought Baja victory to Toyota; thanks to Tamiya*, there's now an R/C version.

KIT FEATURES

The Prerunner's plastic chassis is based on Tamiya's TA02-type chassis, which you'll find in several of Tamiya's on-road racers. The kit is designed for ease of assembly, and the parts fit together flawlessly. The exploded-view instruction manual that comes with the kit is straightforward and easy to follow, even for beginners. Each step in the manual is accompanied by full-size illustrations

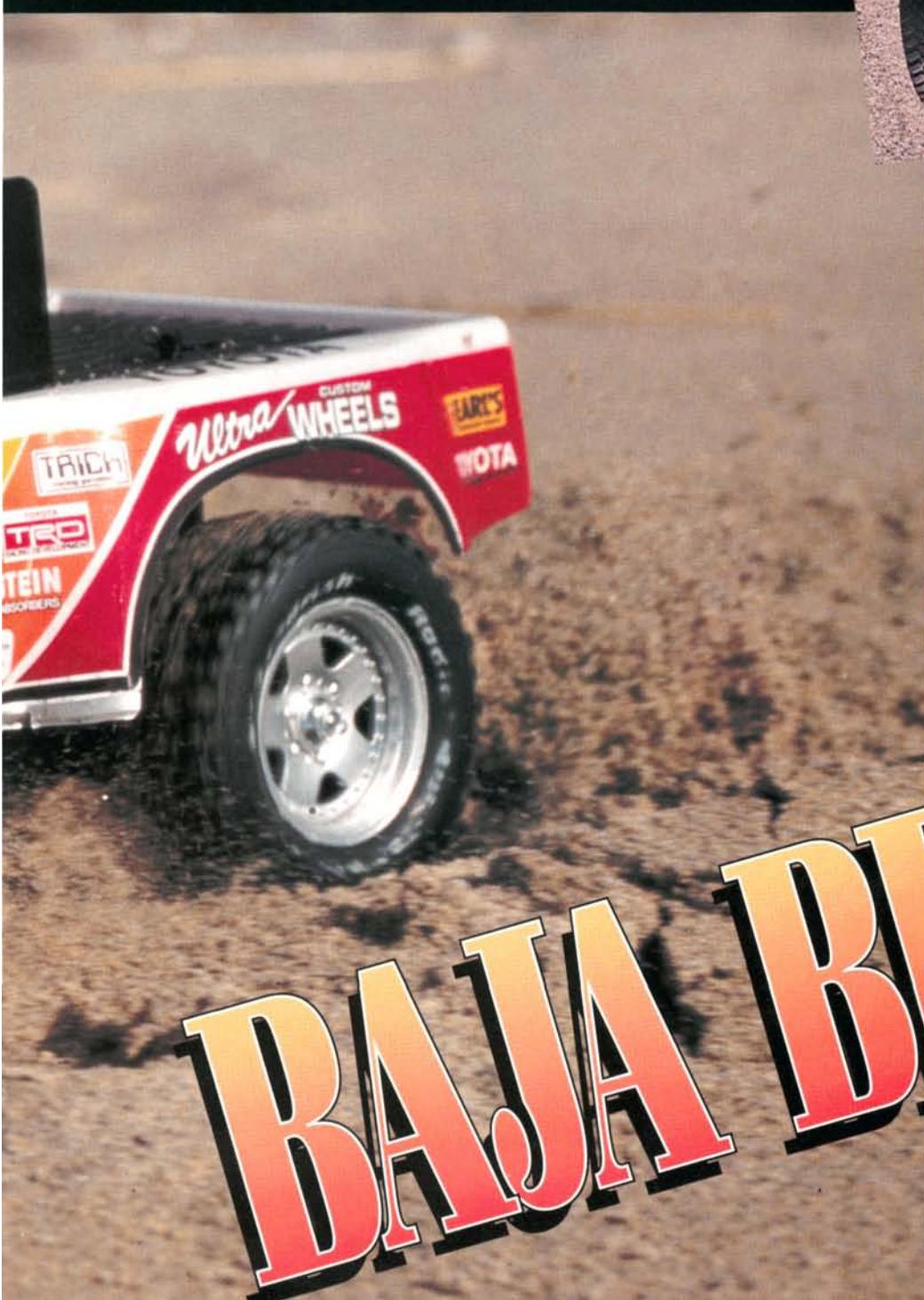
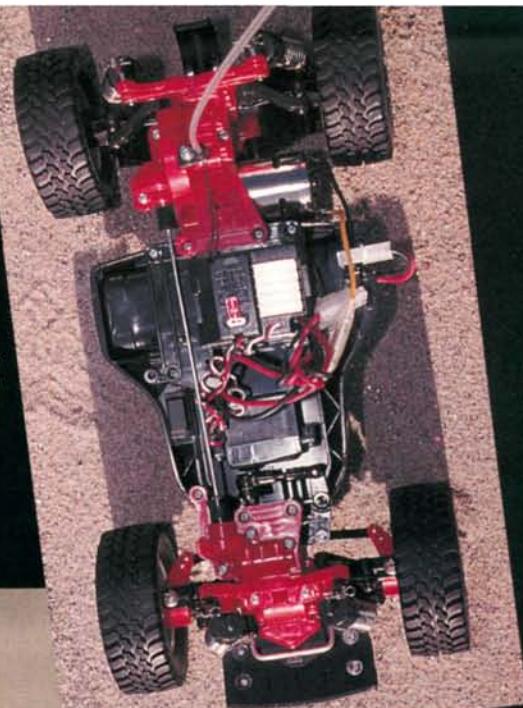
TAMIYA TOYOTA **Prerunner**





Above: among the coolest features on the Prerunner are these highly detailed wheels. They look completely scale right down to the lug nuts.

Right: the layout on the Prerunner is basically simple and relatively straightforward. One tip: mount the ESC on the plastic brace over the battery so that cooling air will pass over it.



of the hardware used in that step. This ensures more organization and less confusion. Even with two differentials to assemble, this kit took only a few hours to put together.

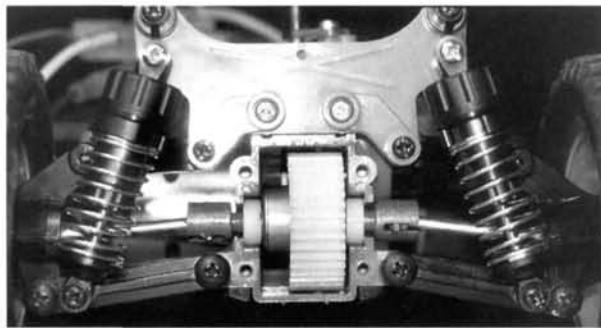
The Prerunner features front and rear sealed gearboxes with two types of differential gearing. The front diff is a non-adjustable, rotary, planetary gear diff. It has three small bevel gears mounted on a star shaft between two larger bevel gears inside the diff spur gear. In the rear, there's a more sophisticated adjustable ball diff.

BAJA BEAST

When properly assembled, both diffs spin as smooth as silk.

The Prerunner's full-time 4WD system is the model of simplicity. The spur gear in the rear gearbox assembly spins a propeller joint that protrudes from the front of the gearbox. The propeller joint spins a steel shaft that extends to a second propeller joint in the front gearbox assembly. The front gearbox includes a counter gear that's connected to the propeller joint that drives the front differential.

The main chassis pan—a standard bathtub design—is made of impact-resistant,



Accessing the rear diff is as easy as removing four cap-head screws and the rear plastic hatch.

sis are all countersunk to avoid "bottom drag." The mounting area for the servos includes a molded slat that allows steering servos of various sizes to be mounted

without having to drill extra holes. A servo and ESC of standard sizes fit snugly but comfortably in the chassis pan. The trickiest part of mounting the electronics in the chassis pan is keeping all the wires away from the drive shaft,

which runs along one side of the car to power the four wheels. (Bind the wires with a rubber band or a twist-tie to help solve this problem.)

The Prerunner's fully independent, double-wishbone suspension is damped by four large-capacity, coil-over, oil-filled shocks with silicone O-rings. Although the

- Easy to assemble.
- Great-looking wheels.
- Fun to run.

LIKES



DISLIKES

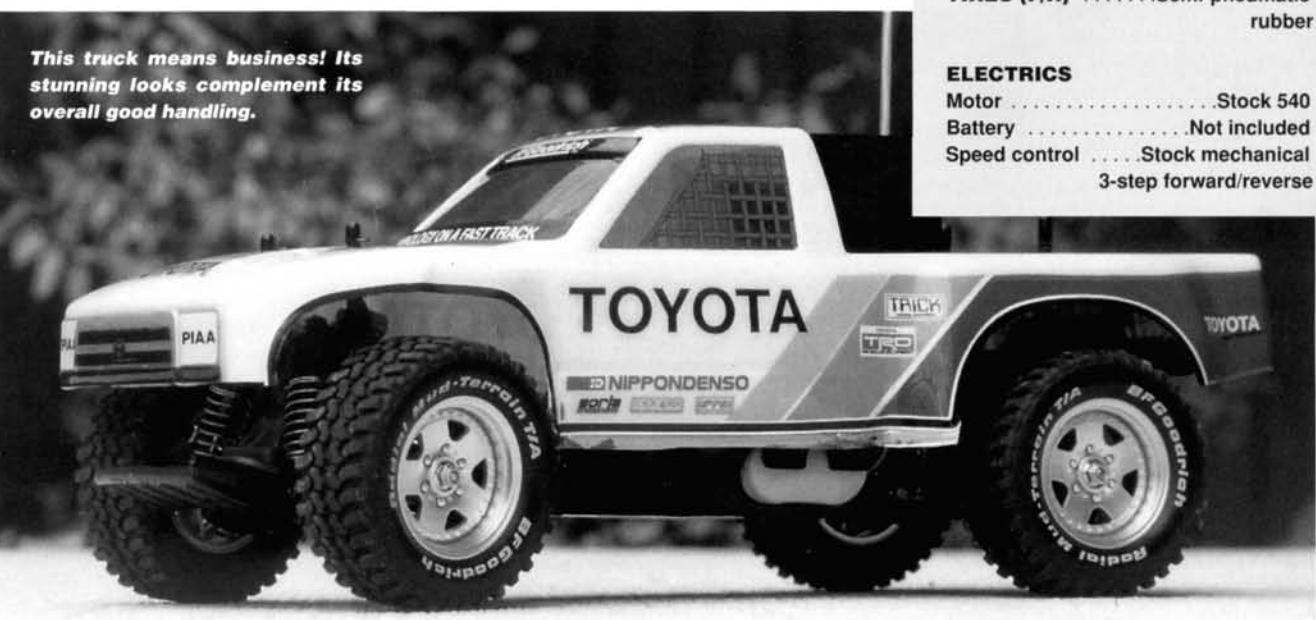


- Plastic shock bodies.
- Non-adjustable camber and toe-in/out.
- Adjusting the front diff requires major surgery.

injection-molded plastic. Rigidity is increased by an upper deck (also plastic) that's bolted onto the main chassis. This helps to reduce fore-and-aft and side-to-side flexing, so the car is exceptionally rigid. It also helps to increase suspension and steering response.

The screws on the underside of the chas-

This truck means business! Its stunning looks complement its overall good handling.



THINGS YOU'LL NEED

- 2-channel R/C system.
- 7.2V Ni-Cd battery.
- Battery charger.

TAMIYA TOYOTA PRERUNNER

Scale 1/10
List price \$260

DIMENSIONS

Overall length 16.1 in.
Wheelbase 10.2 in.
Width (F/R) 7.5 in.

WEIGHT

Gross (ready to run) 3 lb., 5 oz.

CHASSIS

Type Double-deck, modified
TA02-type
Material Injection-molded plastic

DRIVE TRAIN

Type Sealed gear drive
Primary Pinion/spur
Transmission Gearbox
Differential(s)
—Front Rotary planetary-gear diff
—Rear Ball diff
Slipper clutch None
Bearings/bushings Plastic bushings

SUSPENSION (F/R)

Type Independent double-wishbone
Damping Oil-filled coil-over shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 3.5x1.25 in.

Tires (F/R) Semi-pneumatic
rubber

ELECTRICS

Motor Stock 540
Battery Not included
Speed control Stock mechanical
3-step forward/reverse

Building and setup tips

- When mounting the electronics on the chassis, keep all wires away from the drive shaft by securing them with a rubber band or a twist-tie.
- Take your time with the decals; the results will be worth it.
- To enhance its performance over jumps and when landing, try a heavier shock oil.

shock bodies are made of plastic, they held up well over some rough terrain and remained free of leaks. One particularly nice feature is the use of diaphragm oil seals in the shock assembly. These seals allow the shock to be assembled virtually free of air bubbles, so the shock pistons work more smoothly and allow better overall performance.

Tamiya is well-known for its authentic-looking models, and the Prerunner is no exception. It's one tough-looking

will have a place in R/C modelers' heaven. The thought of trimming them was enough to tempt me not to use them all, but after gathering my strength, I went for it, and the payoff was worthwhile. The red, orange and yellow racing decals look fantastic and duplicate the scheme seen on the familiar full-size Prerunner.

TEST GEAR

My radio of choice was the Futaba* Magnum Junior. Even though the mechanical speed control does have reverse (this isn't a racing vehicle), I preferred to use my favorite ESC with reverse—the Futaba MC 210CB. I ran the kit's 540 electric motor; it's powered by a Trinity* Gold Series 1700mAh SCR 6-cell pack.



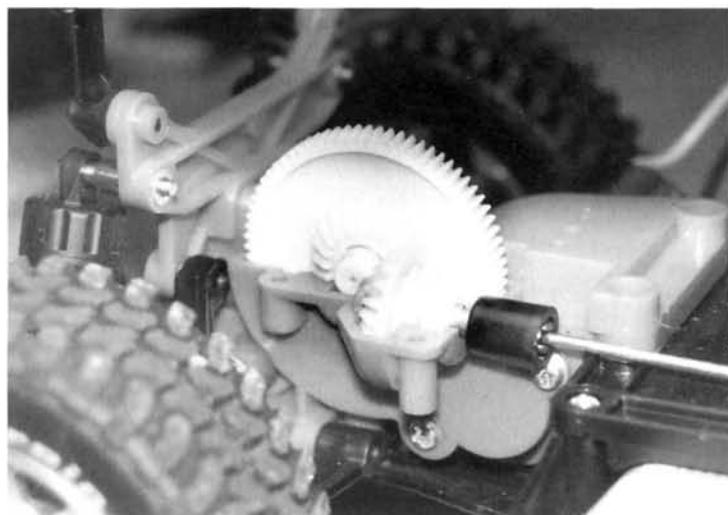
The rear ball diff is compact and light; the front diff is a gear, but it can easily be replaced with a ball diff.

Factory options

- Universal shaft set—part no. 53115.
- Hard joint-cup set—53118.
- 4WD bushing and ball connector set—54144.
- Short-type hard propeller shaft—53152.

hombre—highly detailed and scale-accurate. The flared wheel wells, flatbed and number plates clearly say that this machine means business. The brushed-chrome-look wheels are an especially nice touch. These babies look great, right down to the molded-on lug nuts. Although the wheels are one piece, I was able to mount the semi-pneumatic, all-terrain, rubber tires on them perfectly.

Detailing the light polycarbonate body requires only four paint colors and the included self-adhesive decals. It was easy to mask the windows—often the most complicated part of any paint job—by using the convenient, cut-to-fit masking that's also included. The pieces cover the windows perfectly. Any irregularities



The rear spur gear spins the propeller shaft, which protrudes from the front of the gearbox. The propeller shaft spins a counter-gear in the front gearbox, and, in turn, the gear spins the front differential.

Overall, the Prerunner's strengths are its traction, climbing ability and killer looks. The 4WD makes most average obstacles no obstacle.

between the colors are conveniently covered by clever decal positioning.

Applying the decals was easy, but, oh, save me from trimming them! Anyone who at last designs decals that can be lifted off the sheet and not need trimming

PERFORMANCE

It was time to put the Prerunner to the test. I wanted to check it both on-road and off-road, so first I headed to a parking lot, where it cruised around with ease. The dual differentials provided surprisingly smooth turning. It handled smaller bumps well, but when I tried to get it up over a curb, it just couldn't cut it.

With the standard 6-cell battery pack and the motor running at a pretty good clip, the Prerunner ran for 7 to 8 minutes—plenty of time before you need a new battery pack.

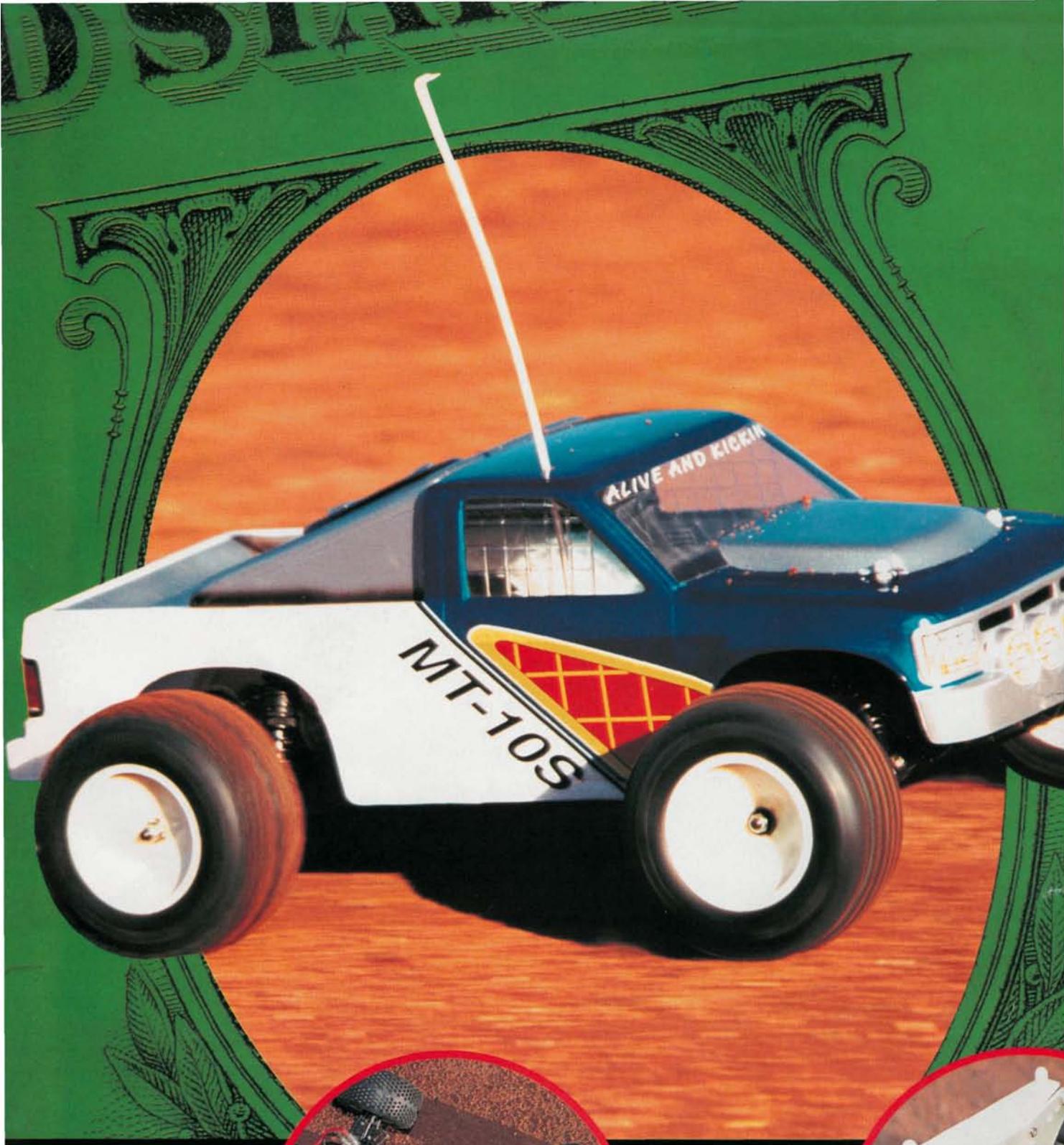
Although this puppy is no high-performance racing machine, it does sport 4WD, so it's ideal for off-track cruising. I moved

along to the backyard. The provided shock oil damped the suspension effectively, and the Prerunner handled the usual backyard obstacles without too much difficulty. I did notice that over jumps, it took off hard and bottomed out on landing. A slightly higher jump made it roll over, but it righted itself and kept on running—amazing! A quick pull on the throttle made it kick up some dirt, but it won't set any speed records either on or off the track.

FINAL THOUGHTS

Overall, the Prerunner's strengths are its traction, climbing ability and killer looks. The 4WD makes most average obstacles no obstacle. The double-wishbone suspension handles almost everything that comes its way—even tall grass. Although it isn't suitable for heavy racing, the Prerunner is the perfect backyard machine.

*Addresses are listed alphabetically in the Index of Manufacturers on page 157.



Even though it's an entry-level stadium truck, the MT-10S has features that seasoned racers will appreciate: a 3-gear tranny with a ball diff; a narrow front bulkhead (which allows the use of long, rigid, front-suspension arms); long rear-suspension arms; and long, oil-filled, coil-over shocks.



A 3-step mechanical speed control is supplied with the kit. It helps to get you up and running without your having to spend more on an electronic one, but if you want a little more performance, you might want to pick one up.



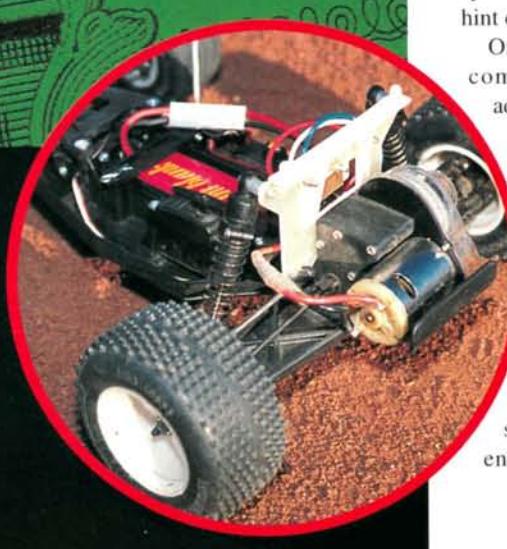
How to become a CHAMPION on a BUDGET

THINGS YOU'LL NEED

The MT-10S kit includes a motor and mechanical speed control, so you won't need too many extras to get it up and running.

- A 2-channel radio system with two servos (one for steering; one for throttle);
- A 6-cell battery pack;
- A battery charger.

The stock 540 motor will get you rolling, but you might want to upgrade to a peppier motor at some time. Out of the box, the motor produces enough speed for a beginner, but after you've been behind the wheel for a while, you might want more power.



MRC MT-10S

by George Gonzalez

With their new $\frac{1}{10}$ -scale off-road MT-10S stadium truck and MT-10M monster truck, the folks at MRC* have pulled another rabbit out of the hat. I was pumped when I found out I'd be doing the "Thrash Test" on the MT-10S. (I think the Fed Ex driver noticed it, too, when I pulled the kit box out of his hands quickly enough to leave blisters!)

KIT FEATURES

Basically, the truck's racing design meets today's standards; in fact, its impressive list of features might lead you to believe that it's a pro-level racing truck, but it's an entry-level goody that may be snatched up for less than \$100. (It's a shame that there weren't any deals like this when I first started in R/C.)

The truck's nylon-composite, non-flex chassis is light and durable. A molded upper deck holds the narrow front bulkhead and steering bellcrank on the chassis and provides a great deal of rigidity. A molded-in battery compartment makes changing battery packs quick and easy, while a 30-degree front rake keeps the truck stable under all conditions. The standard, racing-style, steering-bellcrank system provides super-smooth operation without a hint of bump-steer.

On all corners, you'll find extra-long A-arms, composite-resin, oil-damped bouncers and adjustable camber links; the shocks may not be the high-zoot ones, but you could easily replace them with anodized shocks from Traxxas*, Team Losi*, or Associated* if you wanted to. To adjust the shocks, just change the pistons, spring rate or shock fluid, and they're perfectly suitable for club racing.

The camber links allow you to tune the truck precisely to a particular track, and the fiberglass shock towers have more camber-rod and shock-mounting options than some pro-level trucks I've tested. If that isn't enough, the truck comes with a 3-gear, Warp

The MT-10S is perfect for first-time racers. The instruction manual was designed with them in mind, so rest assured, it will get you through assembly without a hitch. The truck is relatively easy to build, but there are still a couple of areas in which a seasoned racer's help might be useful.

- The drive pins and slipper roll pin are difficult to install; if you have access to a roll-pin setter, use it. If you don't, I suggest that you pick one up. It's a wise investment that costs less than \$10 and is readily available at hobby stores.

- The thrust washers that slip onto the slipper shaft are tight, so to avoid scratching the shaft, be sure to grease it thoroughly before you install them.

- Use a nail file to remove all the flashing from the shock pistons; I noticed some small burrs, which could scratch the inside of the shock body if allowed to remain.
- Although the instruction manual recommends that you use the four-hole shock pistons in the front shocks, I found that the two-hole pistons worked much better with the supplied shock fluid.

Speed tranny with a ball diff and a slipper clutch! The tranny has finely meshed internal gears, an aluminum motor mount and a low final gear ratio (2.625:1) that makes it suitable for modified racing.

Rounding off the list of impressive features are: racing-truck ribbed front tires and step-pin rears; 2.2-inch racing-truck wheels; a 3-step mechanical speed control; a 540 stock motor; a 48-pitch pinion and spur gear; and a hot-looking, Lexan, stadium-truck body.

TEST GEAR

I equipped my MT-10S with an Airttronics* XL-2P radio, a 2-channel AM receiver and two 94102 standard servos. A Trinity* Zip Pack provides the juice, while a custom-painted Motion Graphics* body provides its awesome looks. In the spirit of competition, I later added: a complete set of MRC ball bearings; Pro-Line* Pro-65 staggered rib front tires and Pro-92 Fuzzie "T" XTR rears (with foam inserts); Team Losi Pink rear springs and Yokomo* Gold front springs; a Novak* Racer ESC; a Point Blank* 16-turn double motor; and a World Class matched, 1700 SCRC 6-cell battery pack. I also filled all four shocks with Associated 35WT pure silicone oil.



The rear shock tower has a ton of adjustment holes to choose from—as many, if not more than you'll find on other full-blown racing trucks.

PERFORMANCE

I packed up my gear and took a trip to the Covina Racing Co. in Covina, CA. I was amazed how well the truck handled the track in box-stock form. Considering I was using the stock electrics, speeds were impressive. After a few laps, I had the truck on a consistent line and was clearing the triple jumps in one swoop. I found the truck incredibly easy to drive, and so did several other racers.

My next test session took place at the Ranch Pit Shop in Pomona, CA. This time,

SPECIFICATIONS



Scale 1/10
List price N/A

DIMENSIONS

Overall length 17.75 in.
Wheelbase 11 in.
Front width 13 in.
Rear width 2.875 in.

WEIGHT

(Gross, ready to run) 4 lb., 6 oz.

CHASSIS

Type Molded with upper brace
Material Fiber-reinforced nylon

SUSPENSION

Type (F/R) Lower A-arm with adjustable upper link
Damping (F/R) Oil-filled, coil-over, plastic shocks

WHEELS

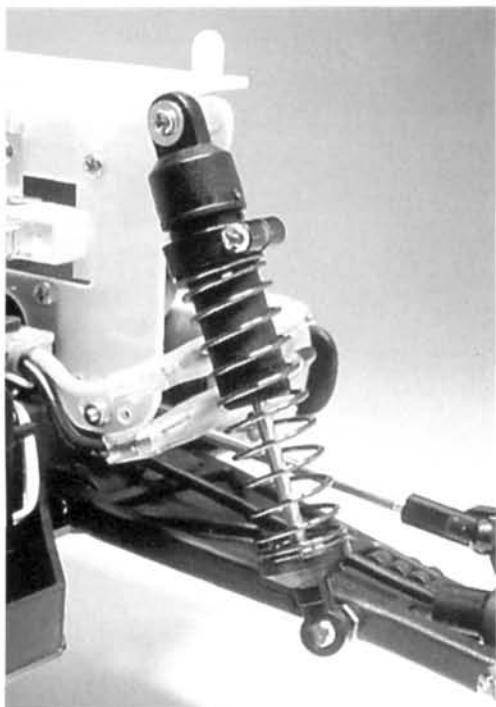
Type (F/R) One-piece nylon
Dimensions (DxW) 2.2x1.8 in.

TIRES

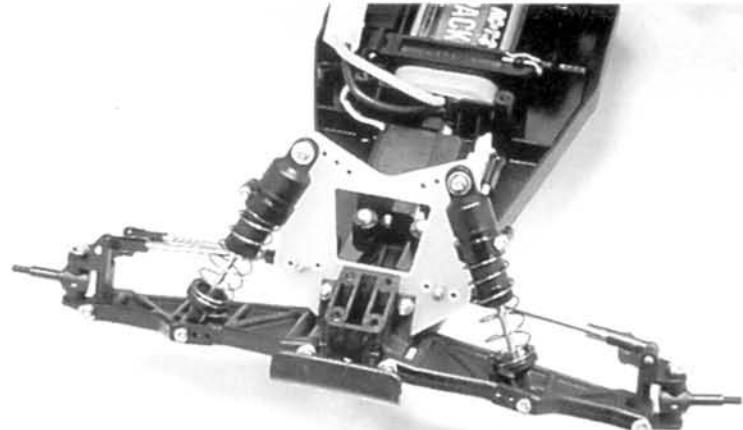
Front 6-row ribs
Rear Aggressive-tread step-pins

DRIVE TRAIN

Type Sealed gear drive
Primary Pinion/spur
Transmission 3-gear with 2.625:1 final drive ratio
Differential Ball diff
Slipper clutch Yes
Bearings/bushings Bushings



Long-throw, oil-filled, coil-over shocks "soften" the roughest bumps. Even though they aren't hard-anodized, the aluminum shocks perform admirably on the track.



The truck's narrow front bulkhead allows the use of long front suspension arms that provide a very stable ride.

- The available set of ball bearings will greatly enhance the truck's performance and reliability.
- There's a ready-to-run version—fully assembled and with a Futaba radio system installed.

Factory Options

likes

- Excellent ball diff and slipper clutch.
- The steering bellcrank system is extremely smooth and tight—no bump-steer here.
- Its extra-long wheelbase and super-wide front and rear track makes the truck incredibly easy to drive.
- The kit's instruction manual is first-rate.

dislikes

- The shock towers are light and sturdy and offer a multitude of camber-rod and shock-mounting positions. The adjustable camber rods also add to the truck's versatility.
- The truck's performance is truly amazing on the track, and I'm sure that with a little more tweaking, I could come very close to my best lap times with it.
- Considering its super low cost, it's hard to complain about this truck, but if I must...
- The truck's rear-axle drive pins and slipper drive pin are very difficult to install; this could be frustrating for first-time builders.

my MT-10S was decked out with some high-performance electrics (see "Test Gear" for details of the hop-ups used). To say the truck performed extremely well would be a major understatement. It was just as fast, responsive and stable as any pro-level truck I've ever tested. In fact, though I'm reluctant to admit it, it actually handled better than some of them. It held a tight line, darted nimbly into and out of turns, and it blazed through the whoops, doubles and tabletop jumps with such agility that I actually looked like a good driver.

THE COMPETITION

	Rustler	Junior-T	RC10ST	Club 10 Storm	MT 10S
Wheelbase (in.)	11.625	11.25	11.375	12.90	13.00
Width (in.)	12.125	12.00	12.50	12.04	13.00
Weight	4 lb., 3 oz.	3 lb., 15 oz.	3 lb., 15.40 oz.	3 lb., 7.58 oz.	4 lb., 2 oz.
Diff type	Planetary gear	Ball	Ball	Ball	Ball
Chassis	CP	CP	CP	Aluminum	CP
List price	\$150	\$139.95	\$240	\$189.50	N/A
Available at*	\$89.99	\$74.99	\$119.99	\$110	\$99.95
Issue reviewed	TC	12/91	3/95	TC	4/95

CP = Composite plastic; TC = To come

*Prices vary with location.

* Addresses are listed alphabetically in the Index of Manufacturers on page 157.

CAR ACTION
THRASH TEST
1/10 SCALE GAS

Have you
driven a



late



SCHUMACHER
NITRO 10

Escort Cosworth

by JONATHAN BIEBESHEIMER

YOU'RE GETTING READY to build your next R/C car, and you have to make a choice. Of course you have to consider where you'll be running the car. Although you can probably find a parking lot to run on-road, the pavement of most will chew an on-road car to shreds; and your most accessible off-road track isn't challenging enough to justify building a serious off-road thrashing machine. That's when a hybrid would be great: a car that really burns up the pavement, but has enough strength to take a bit of a beating. Well, luckily for you, Schumacher* has just the car!

The new Schumacher Nitro 10 is loaded with potential. Its greatest asset is its ability to be adapted to many racing styles. Swap a couple of parts or make a few minor adjustments, and you can easily change your Nitro 10 from an aggressive on-road racer to a responsive off-road vehicle. This flexibility, along with the car's superb design, makes it one of the most practical cars I've built.

SPECIFICATIONS

Scale $\frac{1}{10}$
Price \$199.50

DIMENSIONS
Overall length 17.50 in.
Wheelbase 10.60 in.
Width (F/R) 9.75 / 9.50 in.
Weight (RTR) 3 lb., 14 oz.

CHASSIS
Type Pan
Material Aluminum

DRIVE TRAIN
Type Gear
Primary Clutch/pinion/spur
Transmission Belt
Differential Ball diff
Slipper clutch No
Bearings/bushings Bushings and bearings

SUSPENSION
Type (F/R) 4W Independent
Damping Oil-filled, coil-over shocks

WHEELS
Type (F/R) One-piece plastic
Dimensions (DxW)
—Front 2.25 x 0.80 in.
—Rear 2.25 x 1.25 in.

TIRES (F/R) Semi-pneumatic directional tread

ENGINE
Type Dynamite TNT .12*
Pipe Dynamite stock
w/Schumacher mod.**
Carb Dynamite stock

ELECTRONICS
Futaba* PCM 1024 (FP-T3PB)
radio; Futaba FP-R113IP
receiver; Futaba FP-S130
throttle servo; Futaba FP-
S132H steering servo.

*Not included
**Parts included



*The Nitro 10's chassis is
neat and uncluttered. In this
photo, you can see the toe-
out caused by the fixed-
length suspension links.*

Nothing makes building a car easier than having an organized kit. Schumacher definitely spent some time on the Nitro 10's instructions and packaging. The instructions were very clear, with many helpful reminders and details. The parts were also sorted in a helpful way. For each section of the car (tranny, front suspension, etc.) there was a bag of sorted parts, and this saved me from the time-consuming task of going through a million screws before I could even think of starting to put things together.

You won't need many tools to put it together; this makes the car easier for less experienced R/C builders to deal with. One important note on tools, however: although most of the screws in the kit are Phillips-head, if you look carefully, you'll see that the heads aren't all the same. I was told that some are British-style heads (the Schumacher company is based in England), and that, to avoid stripping them, be sure to find a Phillips-head screwdriver that fits properly. For a few screws, I couldn't find a screwdriver that fit, so I replaced them with screws that have standard heads to be sure they were in tightly and that I would be able to remove them without stripping them in the future.

Overall, the construction was very manageable. It's worth spending a little extra time on a few parts of the car to ensure that you get the best performance.

For instance, the belt-driven tranny seemed to be fairly sensible, but it was a little stiff. A few runs loosened it up (as the belt stretched a little), but still it's worth making sure that the tranny is assembled as carefully as possible.

If they're not assembled carefully, the adjustable shocks can also cause problems. The disadvantage of this system is that the inner piston could be jarred and open or close up more holes in one shock, thus throwing off the suspension. To avoid this, be sure that the inner and outer pistons are aligned properly (as noted in the directions).

The instructions call for threadlock to be used in a couple of places in the suspension. I've seen enough parts rattle loose to always use threadlock where it's called for. It costs only a few dollars (Loctite* Blue is fine for this car), and it's well worth the seconds it takes to put it on (to save the hours it will take to find all the parts that fall off onto the track if you don't!).

Finally, when you build the suspension arms, you might consider adjustable suspension links to replace the kit's plastic ones. Although the plastic links are sized to fit and are good enough, I found that they left my wheels enough "out of whack" (especially the fronts, which had ridiculous toe-in!) to affect performance.



The Nitro 10's clutch system is very well-designed. For even more top speed, replace the two gears shown here with the optional 2-speed transmission.



The kit's tires are very well-suited to pavement use. Schumacher offers several tire choices, ranging from foam slicks to aggressive spikes.

KIT FEATURES

The Nitro 10 is a rear-wheel-drive, gas-powered car. Its backbone is a lightweight, pre-drilled aluminum pan chassis that's anodized brilliant blue; yes, somehow the bright color makes a difference! Unlike any

Things you'll need:

The Nitro 10 comes very close to being ready to run. In addition to the kit, you'll need:

- .12 or .15 engine;
- a good, reliable, 2-channel radio system (including a receiver and two servos: one quick, but strong, steering servo; and one throttle servo);
- a Ni-Cd receiver battery pack;
- fuel;
- glow-plug igniter;
- hand-starter or starter box (if engine isn't a pull-start).

wheels through the drive shafts. The car's ball diff comes assembled, but instructions are included for servicing it.

The kit comes with bushings for the rear hubs, but you can replace them with bearings if you want a smoother drive on the rear wheels. Bearings are supplied for the front wheels, but instead of being inserted into the wheel itself, they're uniquely installed in the front steering blocks.

To ensure that the Nitro 10 will be a stiff competitor, Schumacher supplies a set of excellent aluminum shocks. I'm usually very disappointed in the shocks that come with kits, but not these! Their unique feature is an adjustable piston. Many kits come with a few different pistons (the number of holes each has varies), but the

FACTORY OPTIONS

If you want to make your Nitro 10 a little slicker, check out some of Schumacher's options!

- 2-speed tranny assembly
- Pro-Diff assembly
- Complete bearing set (replaces any bushings in the kit).
- Gearing sets (a good selection of pinion and spur gears).

- Slipper-clutch assembly (good for serious off-roading).
- Five touring bodies (choose from the Ford Escort Cosworth, Opel Calibra, Alfa 155, Ford Mondeo, or Mercedes C-class).
- Full range of tires (every kind imaginable, from foams to aggressive off-road pins).

likes



- The flexibility of design: the car can easily handle many options, the biggest of which is the choice of either a .12 or .15 size engine!
- The flexibility of performance: the car can be easily adapted to a great number of racing terrains and situations.
- Great-quality parts, including a lightweight, but very supportive aluminum chassis and fantastic, adjustable, aluminum shocks.

dislikes



- The kit's non-adjustable suspension links make it nearly impossible to tune the car's handling to where it should—and can—be.
- The battery box (built into the rear of the car) is a great idea, but the receiver is all the way at the other end of the car, and this requires a very long run of wire. It would be nice if they were closer together.

Schumacher pistons are two-piece and can be adjusted to vary the number of open holes. For a softer shock, you can open the inner piston to four holes. For a firmer ride, turn the inner piston the other way to only one hole.

The shocks are mounted on fiberglass shock towers in both the front and rear. The rear shock tower has holes pre-cut for mounting two switches; one can be used to turn the receiver on and off, the other for an optional on-board glow-starter. A small battery box built into the rear of the car has enough room for the servo pack and the additional battery you'll need to ignite the glow plug for the optional on-board glow starter.

TEST GEAR

You'll have quite a few decisions to make as you reach the later stages of construction. For starters, the Nitro 10 can handle either a .12 or a .15 engine! The chassis has drilled and cut holes for either size, so it's very easy to try one or both! One of my cars was "in for repairs," so I took the Dynamite* TNT .12 engine out of it and used it for the Nitro 10. I'm a big fan of the Dynamite engines and highly recommend one for this car. Pay close attention to the parts required for the engine you want to use, however, as there are different sets for each size of engine (the drive-shaft and clutch assemblies are different).

There's also the matter of electronics to deal with. I use a Futaba PCM system in all my cars, and it's what I put in my Nitro 10 as well. For a throttle servo, I chose a Futaba FP-S130, and for a steering servo, I decided to try a Futaba FP-S132H (which I'd had great luck with on a few other cars). I was actually a little disappointed about the steering servo; a friend told me that though it is, in fact, very quick, it isn't all that strong. The lack of strength was fairly noticeable when I drove it: at lower speeds, the car handled well, but at high speeds, the servo wasn't quite strong enough to really make the car maneuver as well as it should. Last, but not least, choose a servo battery pack. The Nitro 10 has a good-size plastic compartment for a battery pack that's designed to fit either a regular 4-cell pack, or a smaller 5-cell pack, which I chose.

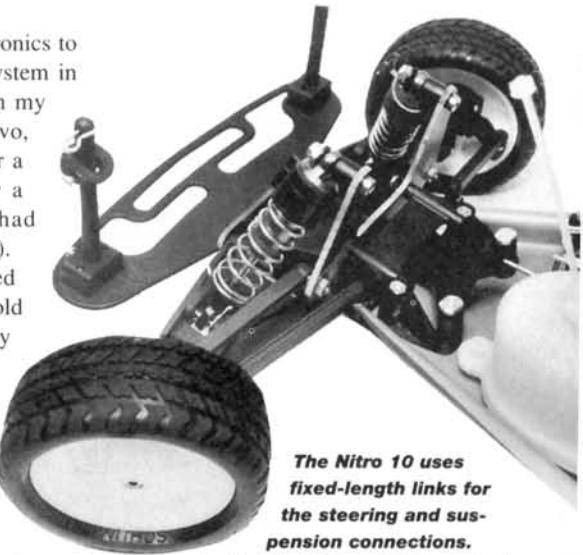
PERFORMANCE

My test runs proved how versatile the Nitro 10 really is. I began with some soft rubber street tires that are similar to Road Hawgs. As I mentioned before, my choice of steering servos wasn't the best, but the car was still extremely responsive. With an extra spacer clipped onto the shocks for a stiffer ride, I was amazed at the car's handling, even in tight turns.



The case at the rear of the chassis houses the receiver pack and, if desired, an optional glow battery. The exhaust gases are routed to the rear of the chassis through this black rubber pipe, which also quiets the engine

Then over to the "pits" for a quick tire change and a softer shock, and "yeee-haaaw!" I sent the Nitro 10 off the track and into the dirt with a set of off-road ribbed tires! At top speeds, the Nitro 10 handled all sorts of bumps, ruts and small obstacles—and even a few jumps. I was very impressed with the way the suspen-



The Nitro 10 uses fixed-length links for the steering and suspension connections.

They're strong, but they don't allow any adjustment of toe-in or camber.

sion cushioned the car in this terrain, especially when I remembered how supportive it had been a few minutes before on the pavement! After a few tanks, it was back to on-road for some speed racing with a set of foam tires. The track I like to run on has a few rough spots, so I decided to leave the suspension a little soft and let it rip! In all the places I had had trouble using different on-road cars (mostly bottoming out!), the Nitro 10 glided along, smooth and controlled!

Although my runs with the Nitro 10 were outstanding, to say the least, on my way home, I was already thinking of the adjustments I was going to make! The biggest fix was replacing the suspension links. Not being able to adjust the wheels made the car a little awkward in some spots; for instance, it was nearly impossible for me to trim the car to go perfectly straight because of the bad toe-out on the front wheels. At top speeds, the car was quite a task to handle! And because I found the car a little on the sluggish side with the .12, I decided to try a .15 engine: hey, if it will fit, why not?! Once again, the car's design allows changes such as these, which really makes it easy to get the most out of it.

The Nitro 10 has definitely won a place on my R/C shelves! There's no two ways about it: it's a great vehicle to have around when *where* you plan to run is an unknown. Pack up the Nitro 10 and an assortment of tires, and you'll turn a day of wishing you had bought a different car into a day of serious R/C racing!

*Addresses are listed alphabetically in the Index of Manufacturers on page 157.



TAMIYA

R/C CHAM

by DOUG MERTES

kickin' back at Tamiya's track



These are just some of the 120 entries in this leg of the R/C championship series.



Darn! I ordered those cheeseburgers over an hour ago!

PHOTOS BY DOUG MERTES

During the drivers' meeting, we all got our instructions from Tamiya's Eric Sands.



PIORSHIP SERIES RACE



IT'S A BEAUTIFUL, late October Sunday morning in Southern California—no rain, no wind, 75 degrees. One thing I have to say about the folks who live out here: they have the perfect weather for parking-lot racing.



Those burgers were great! I wonder who ordered them.

ALISO VIEJO

The second round of Tamiya's* R/C Championship Series was taking place where it had all begun last April—at Tamiya's corporate track in Aliso Viejo, CA. Generally acknowledged as one of the most beautiful and impeccably maintained on-road track sites in the country, today it would see 120 racers vie for trophies and bragging rights in four classes.

Many of those who had participated in the inaugural race were at this rematch. Because the track had been available free of charge to the public on Saturday afternoons, most had finely honed their skills over the summer.

COOPERATIVE SPIRIT

I spoke with one racer from Michigan; he had flown to Arizona, met up with a pit buddy and driven to the race late the night before. Short on funds, they had slept in their truck in the parking lot. During the race, he was unable to keep up the pace in his class,



The Sedan Combined final—
Frank Killam took home the trophy.

so we traded some parts; he gave me his shock parts (mine had broken), and I gave him my modified motor (his was slower). He made the finals in Modified Sedan!

Peak Performance* had just released their two new bushing, modified motors that are set up for F1 (a 15-turn double) and Sedan (a 14-turn double) racing, and both proved to be very fast. Some racers had a hard time getting traction, particularly in the F1 Modified class. Most F1 cars were running either kit tires or HBR rubber donuts, while Super Slicks and M-Grip tires were the order of the day in the Sedan class. The abrasive nature of the asphalt made for short tire life—in some cases, only four or five runs!

There was a guy who raced in the heats and semifinals of the Stock Sedan class, and he completely wore out his tires. I mean, there was nothing left but rims and sidewalls! Several other racers lent him wheels, tires and gears so that he could make it to the Main. He didn't win, but he definitely went home with a different outlook on racing!

Tamiya decided not to sell replacement parts at this event, and many racers had to

borrow from their neighbors in the next pit.

ON DISPLAY

You can see in the photos that there were lots of families and spectators present. During intermission, Tamiya had some demo cars available for several lucky spectators to try on the track. The company also had some of its new $\frac{1}{8}$ -scale, 4WD, on-road, gas cars on display. I'd like an Opel, please! The new ProMarkt Mercedes body set that was made for 4WD sedans, and Bobby Rahal's on-road Indycar body set, were also on display.

THE WINNERS

Jay Jamison flew in from San Francisco the day before the race, and he won the Concours competition with a gorgeous turquoise Mercedes-Benz D2 that had matching detailed interior. He's a professional auto-body painter by trade, and he has promised to share his secrets, in a future article, of how to make auto paint stick to Lexan.

Doug Adams took Formula 1 Concours with an amazing Ayrton Senna Williams Renault that included wheel warmers and a digital-display readout on the cowl.

Non-sponsored drivers won all four of the class titles. Richard Dee won F1 Stock, while Dave Gestoso captured F1 Modified. Sedan Stock went to Don Ham, and Frank Killam took home the trophy in Sedan Modified.

Many of the drivers felt that mixing Stock and Modified Mains in the same 10-car race was a mistake. The stock guys thought that they were going to get run over from behind, and the modified racers had to dodge through the stock finalists at every corner once the field spread out. Maybe next time they'll be split up.

All in all, it was an incredible day of racing: great weather, a terrific crowd and a beautiful track. What more could you ask for?

* Addresses are listed in alphabetical order in the Index of Manufacturers on page 157.



This Williams Renault took F1 Concours honors.

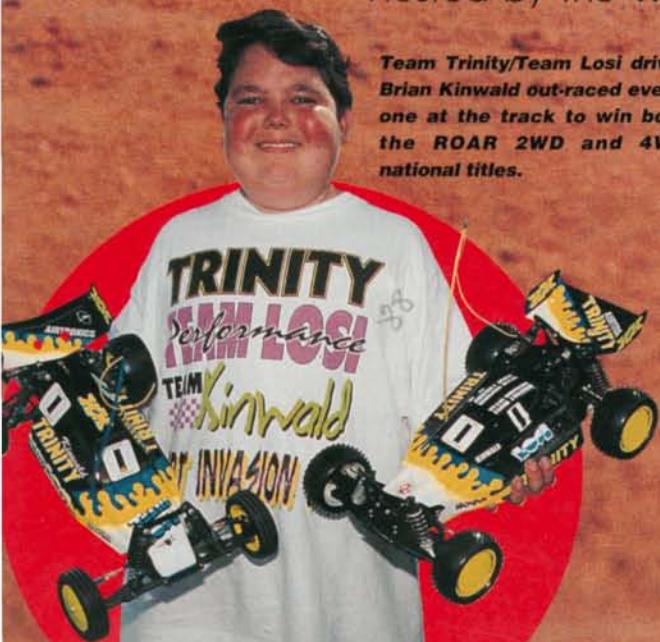
ROAR Modified Buggy A L M O S T R



by RICK SCHWARTZ

THE NATIONALS. The best racers in North America. Qualifying for the Worlds. Beautiful weather. Modifieds only. Heavy team competition. New products. Sound like racers' heaven? It was almost perfect. It was awesome. It was off-road at its best.

Hosted by the West Coast R/C Club of Tampa, FL, which is famous for the Winterchamps, the 1994 ROAR Modified Buggy - National Championships had all the ingredients necessary to produce four days of edge-of-your-seat action. More than 250 racers vied for a shot at the title.



Team Trinity/Team Losi driver Brian Kinwald out-raced everyone at the track to win both the ROAR 2WD and 4WD national titles.

THE TRACK

One of the great things about the Tampa club is that it changes the track layout frequently. A new configuration was installed just before the race, and racers were prohibited from practicing until the track had officially opened for the event. Everyone started on an equal footing. The design was tight with a lot of bumps and jumps. Speed was not the winning formula; suspension and tire combination were.

Buggy NATIONALS

PERFECT

40
Qualifiers
for the
Worlds 2WD
and 4WD

- John Anderson
- Barry Baker
- JD Beckwith
- Aaron Biner
- James Brown
- Scott Brown
- Francois Couillard
- Greg Dennet
- Brian Dunbar
- Matt Francis
- Mark Francis
- Derek Furutani
- Carlos Gonzalez
- Greg Hodapp
- Rick Hohwart
- Scott Hughes
- Jimmy Jacobson
- Darrin Jendreas
- Jack Johnson
- Joel Johnson
- Dean Karns
- Jeffrey Kinoo
- Brian Kinwald
- John Konce
- Jeremy Kortz
- Matt Ledger
- Gil Losi Jr.
- Mike Mellin
- JR Mitch
- Jonathan Morgan
- Mark Pavidis
- Brad Reelfs
- Bret Reelfs
- Scott Roberts
- Jason Ruona
- Frosty St. Clair
- Richard Saxton
- Shorab Tavakoli
- Chris White
- Paul Wynn

PHOTOS BY RICK SCHWARTZ



ROAR MODIFIED BUGGY NATIONALS



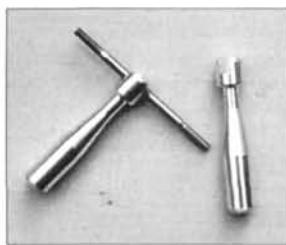
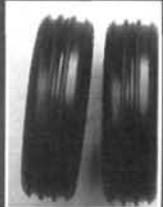
Team Losi* has some new hot and nasty parts for its Double-X vehicles. A really bitchin' part whose time has come is a replacement, one-piece, anodized-aluminum

XX rated

top shaft with a steel threaded insert for the tranny. Toss your gear, shaft, pin, spacer and E-clip. This top shaft does it all. It's available for both cars and trucks. New suspension aids

include yellow springs that are rated at 2.0 (softer than the pinks) and 25-degree spindles and carriers that already have the correct geometry and reduce shimmy and bump steer.

Team Losi, known for putting the rubber to the road, has a new, front, wide-body rib. The design provides more steering and is available in the gold compound with the foams provided.

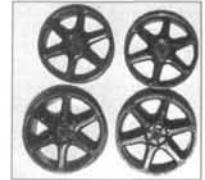


Wrench me

Lunsford Racing* manufactures a really neat turnbuckle wrench that makes adjusting caster and camber a whole lot easier. According to Kelly Lunsford, the wrench, which is made out of T-6 aluminum, is "ergonomically correct," user-friendly, and it fits all the 150 turnbuckle programs. His new line of tough titanium Punisher turnbuckles is available for just about every vehicle on the market.

Reach your peak

Peak Performance* president and racer Rick Hohwart had some tough-looking new rims on display. The black, six-spoke wheels are light and rigid—the two characteristics that racers look for. Rick finished third overall in both the 2WD and 4WD A-Main. Could the rims have had something to do with it?



Who has the edge?

One of the most discussed tires at the Nationals was the Edge front buggy tire from Pro-Line*. With a completely new tread design, the tire has tapered sharp edges instead of ribs. According to top Pro-Line tire man Tim Clark, the new design gives you more traction for aggressive steering. The tire is a prototype based on the winning truck tire run at the Truck Nationals.



The only glitch the whole weekend was a computer problem on Friday morning. Racing was delayed for several hours. Although it could have been a major catastrophe, club members and racers worked together, and all the qualifying races were completed fairly close to the original schedule. Hats off to race director Bert Price.

THE QUALIFIERS

Mod cars only. This was the first year that ROAR separated the Stock and Modified Nationals. No handouts here. Each racer had four attempts to climb the ladder to the A-Main.

Most of the best times were turned in during the first two rounds, but the racers on the bubble kept changing until the last qualifying races had been completed. The 4WD class TQ was Brian Kinwald. He turned nine laps in 4:15.090. He was followed by Losi teammate Jeremy Kortz with nine laps in

4:17.850, and Peak Performance president Rick Hohwart with nine laps in 4:18.230.

The 2WD class finished late on Saturday afternoon, and when the smoke had cleared, the TQ was again Brian Kinwald with eight laps in 4:02.590. Associated's Matt Francis was a bumper length behind in second with eight laps in 4:02.620.

Jeremy Kortz again was in the top three with eight laps in 4:03.550. The competition was so hot that all of the drivers who had qualified 14th through 25th had eight laps

with times ranging from 4:09.000 to 4:09.850. Eleven drivers were separated by less than 1 second. Smokin'.

THE MAINS

As in most national events, the A-Main drivers competed head-to-head in three heats



This track regularly hosts the Team Losi Winterchamps and is one of the premier facilities in the country.

2WD Modified

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Brian Kinwald	Losi XX	Trinity	Trinity	Novak	Airtronics	Losi Jammin	Losi
2	5	Mark Francis	RC10	Reedy	Reedy	Novak	Airtronics	RCPS Mirage	Pro-Line
3	9	Rick Hohwart	Losi XX	Peak	Orion	Novak	Futaba	Losi Jammin	Losi
4	4	Mark Pavidis	RC10	Reedy	Reedy	Novak	Airtronics	RCPS Mirage	Pro-Line
5	2	Matt Francis	RC10	Reedy	Reedy	Novak	Airtronics	RCPS Mirage	Pro-Line
6	7	Greg Hodapp	Losi XX	Peak	Orion	Novak	Airtronics	Losi Jammin	Losi
7	10	Brian Dunbar	Losi	Trinity	Trinity	Novak	KO Propo	Losi Jammin	Losi
8	6	Bret Reelfs	RC10	Reedy	Reedy	Novak	Airtronics	RCPS Mirage	Pro-Line
9	8	Matt Ledger	RC10	Reedy	Reedy	Novak	JR R-756	RCPS Mirage	Pro-Line
10	3	Jeremy Kortz	Losi	Peak	Orion	Novak	JR Propo	Losi Jammin	Losi

Trinity's toys for the boys

Trinity* motor man Todd Putnam laid out a table full of new goodies for me to look at. The new battery bars are called "Lennon Lugs," because they look like John Lennon's glasses. Made of copper they're the lightest in the industry, and they're easy to solder.

Another new item that helps with weight reduction and really dresses up the chassis is the purple-anodized aluminum hardware (screws, nuts and bolts). Purple looks tough! It's available as a complete kit, or it can be purchased as individual pieces. An exclusive for Trinity is the new Panasonic 1800 SCR Z Series cells. They have greater capacity than conventional 1700s and a higher voltage than P170s.

The final item I checked out was the new BuggyWald motor. It's a machine-wound, 13-turn double with adjustable timing, 5.1 wet magnets, short-stack armature and bearings. According to Todd, it gives you 95 percent of the performance of a hand-wound Kinwald motor for 50 percent of the cost.



Schumacher specialties

Warren "The Silver Fox" Clapp showed me some hot items from Schumacher inc.* that included some sharp-looking, three-spoke wheels that are designed to prevent dirt from accumulating. Made of rigid, lightweight plastic, they're available for the front and rear of 2WD and 4WD cars. They'll look great on your Schumacher, Losi, or Associated car. Added to the Schumacher tire line are some rear flat stubbies (part no. U6589). They are Bibx-compound, soft natural rubber and come with the foams included.



Changes have been made to the '95 edition of the Cougar 2000. Improvements include a new SACS front end (Schumacher Active Camber Suspension), which allows increased caster during front-suspension compression, and a longer chassis design. The battery is moved forward for better weight distribution.

to determine a winner. A racer's two best finishes determined his final position. If scores were tied, the race director went to the third finish as a tiebreaker. This was serious business now. To ensure smooth racing, Warren Clapp (Schumacher), Tyree

Phillips (Novak) and Eustace Moore (MIP) were appointed to monitor the A-Mains. The first class to be decided was 4WD. TQ Brian Kinwald took first place in heats one and two, ensuring a championship. He decided not to race in the third heat, which



A family commitment

Sportsmanship, dedication, respect and responsibility. Tough things to learn at any age—especially at 16. It's a lot easier, though, when you have a guiding hand to help you. Clyde and Anthony Andrews are a perfect example of how working together as a father-and-son R/C team can produce those qualities.

Although his son Anthony is the only one who races, Clyde was by his side the entire weekend, working on the cars and helping Anthony prepare for his Qualifiers and Mains. Clyde told me that he has been doing this for the 4½ years that his son has been racing. It must help, because Anthony was part of the Peak Performance Racing Team, driving a Losi Double-X in 2WD and a Yokomo in 4WD. Anthony feels that his dad's presence has helped keep him calm, cool and collected. It must be nice to have someone on hand all of the time to congratulate or console you.

Back home in Atlanta, the Andrews team usually races two to three times a month. Although Clyde didn't finish in the A-Mains, he and his dad are both winners. Just remember that old R/C saying: the family that plays together, stays together.

created a little controversy.

ROAR President Robert Morgan felt that Brian should race all of his heats. Most of the drivers disagreed. Gil Losi Jr. put it succinctly when he told Morgan that since Brian had already won, he could only

4WD Modified

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Brian Kinwald	Yokomo	Trinity	Trinity	Novak	Airtronics	Losi Jammin	Losi
2	7	Scott Brown	Yokomo	Peak	Orion	Novak	JR R-756	Yokomo	Losi
3	3	Rick Hohwart	Yokomo	Peak	Orion	Novak	Futaba	Yokomo	Losi
4	6	Derek Furutani	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line
5	9	Greg Hodapp	Yokomo	Peak	Orion	Novak	Airtronics	Yokomo	Losi
6	8	Mark Pavidis	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line
7	4	Greg Dennet	Yokomo	Reedy	Reedy	Tekin	Airtronics	Yokomo	Pro-Line
8	2	Jeremy Kortz	Yokomo	Peak	Orion	Novak	JR Propo	Yokomo	Losi
9	5	Jason Ruona	Yokomo	Reedy	Reedy	Novak	CSZP	Yokomo	Pro-Line
10	10	Frosty St. Clair	Schumacher	Reedy	Reedy	Novak	Airtronics	Schumacher	Pro-Line



"I wish I hadn't accidentally spilled all my Zap CA onto the table here. Can somebody help me?"

TEAM LOSI

TECH TALK

DON'T GET SLOPPY

As you put more time and runs on your car or truck, the suspension arms—and, basically, anything else that moves—stretch and wear. Here at Team Losi we have a very rigorous quality-control program. We make every effort to ensure that the parts have the best possible fit when you get them. Unfortunately, there's little or nothing we can do to prevent these parts from wearing out.

As the arms begin to wear, you'll notice some slop between the spindle carrier, or hub, and the arms. You can take out this slop by shimming the hub or carrier. The best things to use here are motor shims. Motor shims come in a variety of thicknesses that can be used to eliminate virtually all the slop from any moving factory parts. If you look at any of the factory drivers' cars, I'm sure you'll find that they use shims to take up some of the slop that occurs over time.

The shims can also be used on the inside of the suspension arms in the same manner. When shimming the parts, take care not to add too many shims. The parts must always move freely without binding.

BE SURE TO USE WASHERS

Over the last few weeks, I've seen several Double-X and Double-XT owners cracking the transmission housing near the holes that are used to attach it to the rear bulkhead. The problem is that, in every case I saw, the owner hadn't bothered to use washers on the two screws that go into the rear bulkhead. As a result, the screw head had been tightened into the transmission housing, causing it to stretch and be stressed. As soon as this part saw an impact, the housing cracked straight out through the front near the hole.

If the washers are used, the screw head can't be tightened and smashed into the transmission housing. This results in a much stronger, more rigid rear suspension and transmission housing. Also keep in mind that there's no need to "crank down" on these two screws! It's sufficient to just tighten them until they're snug.

Let us know what's going on! Address your questions and problem to Team Losi, "Tech Talk", 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

ROAR MODIFIED BUGGY NATIONALS

hinder the other racers who were trying for the other top spots. Brian held his ground and was a spectator for the last 4WD A-Main heat.

Scott Brown, who finished 10th in the first heat, took second and first places in the last two races to finish number two overall. Rick Hohwart used two third-place finishes to take the number-three slot.

Last, but certainly not least, were the 2WD Finals. In the first race, Mark Pavidis drove past TQ Brian Kinwald to take the first win. Kinwald was second and Rick Hohwart was third. Matt Ledger was penalized by the judges for "rough driving" and was moved from fifth to last.

The second heat was hot and heavy! These drivers still had two shots at the title. The race was won by the number-two qualifier Matt Francis. Brian Kinwald was a steady second, with the other half of the Francis brothers, Mark, taking third. It all went down to the third and final heat. Kinwald, Pavidis and Matt Francis all had a chance for the title. When the flag went down, Brian Kinwald shot out to the lead, turning consistent 30-second laps to finish numero uno. When the overall totals had been posted, Team Losi's Brian Kinwald was the 2WD ROAR national champion. Associated's Mark Francis was second,



Associated's Mike Reedy prepares another motor for an upcoming qualifier.

on top of the world



One of the great things about the ROAR Nationals was

that it produced a lot of winners. Of course, everyone was competing for the coveted national titles, but there was a secondary agenda on the minds of many racers: qualifying for the IFMAR Worlds! They didn't even have to finish in the top 10 or 20 to make the American team.

In the summer of 1995, 40 racers will go to Tokyo, Japan, to vie for the title of World Champion. (Eleven racers have already qualified for the team by finishing in the A-Mains at the 1993 event.) Although everyone was watching the A-Mains, many of the drivers in the B- and C-Mains were concentrating on finishing near the top of their heats and hoping for a chance to make the trip to Tokyo.

The long road to the Worlds begins at the local level with drivers participating in club races. The next step is the Regionals, because you must qualify in order to race at the National Championships. Finally, you must race against more than 250 of the best drivers in the country at the Nationals and finish near the top.

with Peak Performance's Rick Hohwart combining a third and fourth place to take third overall.

THE DAY IS DONE

After four days of heated competition, victories and defeats, elation and disappointment, it's amazing how quickly things return to normal. All the tension and stress that builds up dissolves as awards are given out and congratulations are extended. Having the Hooters girls there to dispense the trophies didn't hurt either. Kudos to the West Coast R/C Club, race director Bert Price, ROAR officials, the sponsors and, of course, the drivers. As most of the racers were leaving, you could hear that old refrain: "Wait till next year!" ■

ONCE UPON a time, I had this really big truck, and I ran over a lot of things. I drove up hills, through mud, over rocks and even over people's heads. It was the

biggest truck in the land (well, at least in my town) and people feared it (at least our photographer did after I had run over his head). It was my Project Big Truck and, believe you me, it was

definitely a beast.

For those of you who aren't familiar with my Project Big Truck, it started out as a Tamiya* Clod Buster; but it went through a major aluminum meta-

THE PROJECT Big Truck

by JOHN HOWELL

It's bigger
than big...
It's really big!



PHOTOS BY JOHN HUBER AND WALTER SIDAS

morphosis, thanks to the good folks over at ESP Hobby Mfg.* (If you're interested, you can refer back to the original article in the July '94 issue.) Out went the old

stock chassis and suspension; in went a new Clodzilla II chassis.

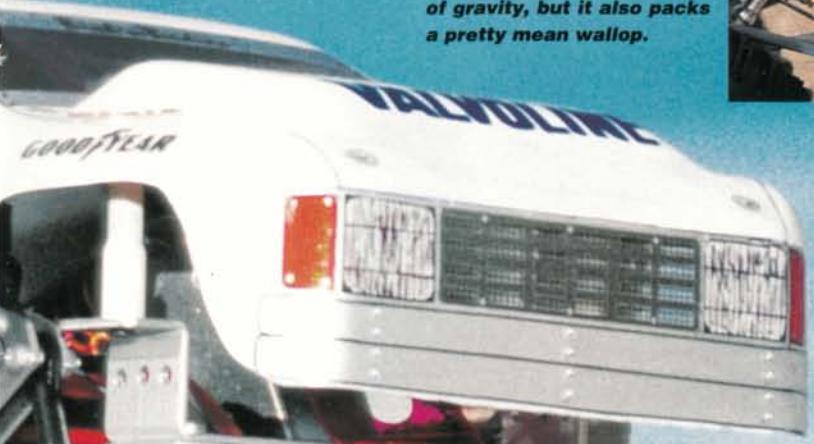
Out went the stock gearboxes; in



A Trinity 9-cell 1700mAh SCRC Pro Pack, nested low in the chassis, not only helps provide a low center of gravity, but it also packs a pretty mean wallop.

went a set of JPS* aluminum gearboxes and axle tubes. Out went the.... Come to think of it, just about everything went out. Anyway, it was a really cool truck.

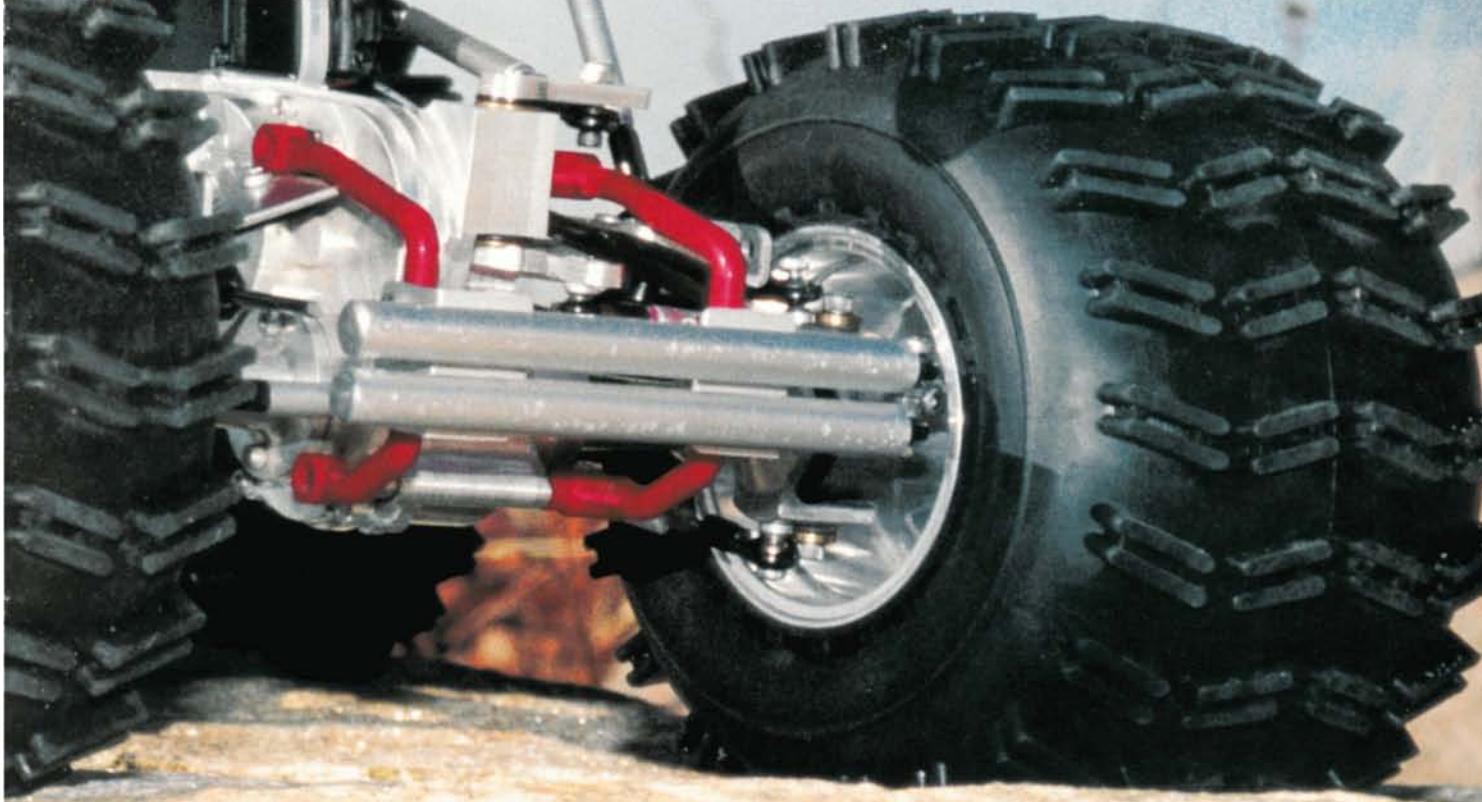
PART 2



Check out the Novak cooling fan that's mounted on Novak's new ESC—the Hammer Pro. I also used a Novak NER-3 FM to receive my Futaba PCM's radio waves.



Machined-aluminum servo-savers on the front and rear gearboxes ensure that I don't destroy my two JR servos.



PROJECT BIG TRUCK

A few months after I had completed Project Big Truck, Eric Sutcliffe at ESP informed me that they were working on an all-new chassis and cantilever suspension design for the Clod Buster. It looked as though it was time to start work.

PROJECT BIG TRUCK, PART 2

The backbone of my Project Truck is the all-new, full-race, ladder-frame chassis—Clodzilla III. The Clodzilla III chassis is narrower and lower in profile than its predecessor—the 'zilla II. The III's chassis consists of $\frac{1}{4}$ -inch-diameter aluminum tube, while the II's was made of $\frac{3}{8}$ -inch. The result is an extremely light—yet strong—chassis. Its overall weight is only 10 ounces, which is roughly the same as the original ABS plastic Clod chassis, only it's a zillion times stronger. A special light aluminum radio tray for mounting your ESC and receiver is included. The chassis also comes with multi-position shock mounts (to allow variable shock-mounting angles) and low-profile aluminum body mounts.

Added to the III's chassis is ESP's Multi-Link Long Suspension kit—the same one that I used on my first Project Truck. Basically, this suspension kit replaces the stock Clod Buster's plastic suspension arms, red support arms and motor support arms, while it gives your truck a significantly stronger suspension system and improves wheel travel and overall handling. By using this suspension kit, you increase your wheelbase (axle to axle) to 14 inches.

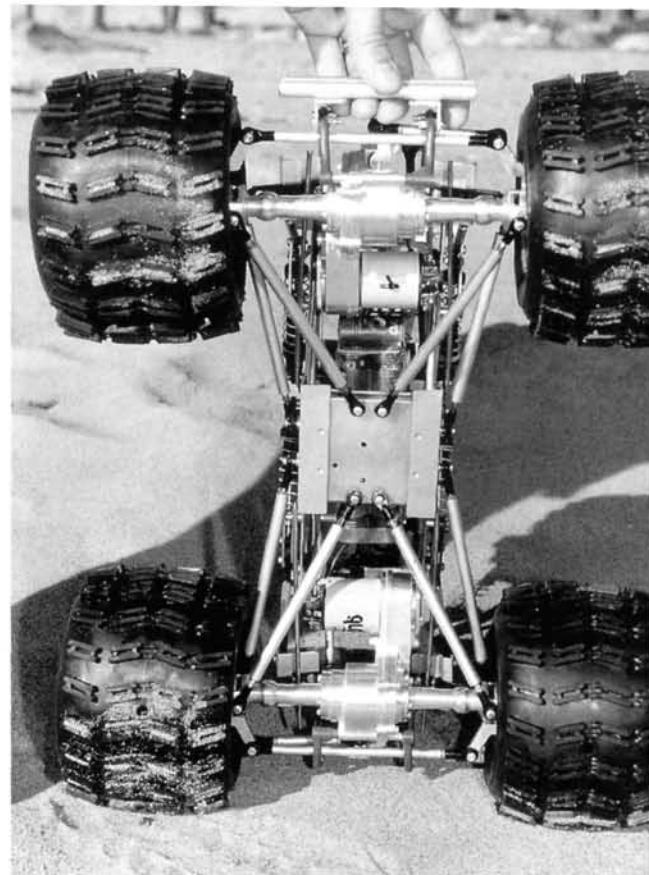
The suspension kit also includes four aluminum lower shock mounts and two

As you can tell from this underside view, the truck's chassis and multi-link suspension system are pretty beefy.

longer steering rods that are used with a single, centrally mounted steering-servo setup. I opted, instead, to run ESP's Dual Servo Conversion kit; but there will be more on that later.

SOUPED-UP SUSPENSION

As you can see, the cantilever suspension on this truck is totally state of the art; it's definitely the truck's most unusual feature. Those of you who are familiar with my first Project Truck will notice that this new cantilever



Things You'll Need

- Clodzilla III chassis—part no. ESP036 (\$69.95)
- Clodzilla III chassis kit; suspension kit; heavy-duty steering rod kit with rod ends—ESP044 (\$179.95)
- Cantilever III suspension kit—ESP039 (\$49.95)
- Dual Servo Conversion kit—ESP040 (\$19.95)
- Two Clodzilla Power-Up motors—ESP042 (\$89.95/pair)
- Two ESP aluminum servo-savers—ESP038 (\$39.95 each)
- ESP aluminum twin-tube lower bumper—ESP003 (\$16.95)
- Two JPS gearboxes—7000 (\$150 each)
- Four JPS aluminum wheels—1407 (\$75/pair)
- Two JPS axle tubes—7060 (\$150/pair)
- Four Pro-Line monster truck tires—1056 (\$27.95/pair)
- Novak Hammer Pro—1750 (\$199)
- Novak ESC cooling fan—5645 (\$25)
- Dahm's Commando XL8 body—D057 (\$23.98)
- Two JR 4721 Ultra-Torque Coreless Ball-Bearing servos—JRPS4721 (\$109.95 each)

suspension system looks quite different from the system that was incorporated into the Clodzilla II's design. The 'zilla II's chassis is a little more spacious than the III's, so it was possible to run the shocks outside it in a conventional up-and-down manner. Because of the lack of room on the III's chassis, the new system was designed with space limitations in mind, and that's why the shocks are now mounted inboard. Although the two systems may look differ-

ent, they both operate in the same way—using a rising-rate suspension design.

The Cantilever III system that's used on this truck increases wheel travel and lowers the truck's ride height, which, in turn, lowers the truck's overall center of gravity (CG). With a lower CG, the suspension system gives the truck a much more stable and sure-footed ride over rough terrain, and it aids in the cornering department as well. Four $4\frac{1}{2}$ -inch oil shocks (not included) provide the damping. Notable off-road racing companies, such as Team

Losi*, Associated* and Traxxas*, all offer shocks that are suitable.

MORE TURNING POWER

As I mentioned earlier, I opted to try out ESP's new Dual Servo Conversion kit instead of running the single-steering-servo setup I used in my first Project Big Truck. The Dual Servo Conversion kit consists of two aluminum brackets that are installed in place of the stock-motor covers. The servos

are secured to the top of the aluminum brackets, and a short aluminum link goes from the servo horn to the servo-saver that's mounted on the gearbox,



Pro-Line monster truck tires mounted on JPS aluminum wheels get tons of traction. The vee-tread design really kicks up the dirt!

PROJECT BIG TRUCK

which consists, once again, of a few leftovers from my Project Big Truck, Part 1 (a set of JPS aluminum gearboxes that had JPS aluminum axle tubes attached to them).

There are a few benefits to running the Dual Servo Conversion kit: your truck will steer more easily because you're using two servos—rather than one—to turn all four wheels; you'll get more precise steering response; and, because the servo is mounted above and behind the motor in the gearbox, you won't have to worry about running a large bumper to protect it (it's nestled up inside the truck out of harm's way).

In Project Big Truck, Part 1, I used a single JR* 4735 servo to turn all four wheels. Although the 4735 is a decent servo—with 90 oz.-in. of torque—I wanted more turning power, so I decided to go with two JR 4721 servos. The 4721 has 119.6 oz.-in. of torque, and because I was running two of them, I knew I would have plenty of power.

With the Dual Servo Conversion kit, you can use a 2- or 3-channel radio with mixing capabilities. If you use a 2-channel radio, you must use a Y adapter because it will operate both servos simultaneously on one channel. According to Eric Sutcliffe, if you opt to run the Dual Servo Conversion, you don't have to go crazy and get really high-torque servos; servos with 45 to 50 oz.-in. of torque will suffice.

MONSTER MOTORS

To power the beast, Eric provided me with a set of his new Clodzilla Power-Up motors; they're Yokomo-based 19-turn doubles in which the front motor is wound normally while the rear gearbox uses a reverse-rotation motor. After experimenting, he settled on those because they provide a good overall power band with a lot of torque and speed, but they don't sacrifice too much run time—a perfect blend.

At the end of each modified motor, there's a steel, 32-pitch, 12-tooth Robinson Racing* pinion gear. Eric recommends that you use the steel gears because he found that the stock aluminum Tamiya pinions wear too quickly when they're used with modified motors. I was able to use the Robinson 12-tooth pinions instead of

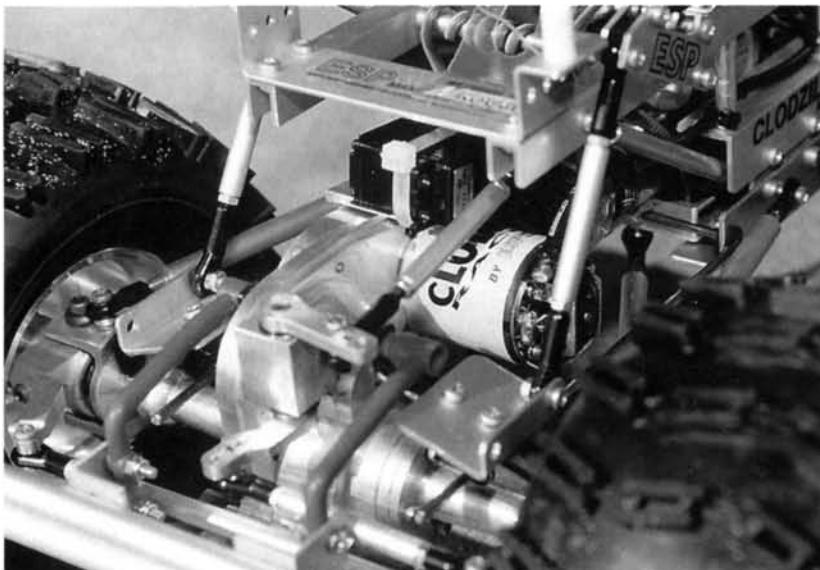


ESP's Clodzilla Power-Up motors provide plenty of get-up-and-go power. Using ESP's Dual Servo Conversion kit allows you to place each servo on top of the gearbox case. I used two JR 4721 high-torque servos, and I servo-taped them and zip-tied them into place for added security.

the stock 13-tooth size because I used the JPS gearboxes, which have longer motor-bolt slots cut into the gearbox case.

ENERGETIC ELECTRONICS

When it's time to choose the electronics for your monster truck, you have to pick wisely. This time around, I decided to try Novak's* all-new Hammer Pro forward-only racing-style ESC. It can handle four to 10 cells, has an incredibly low "on" resistance and is an overall beefy unit. Its One-



I used JPS gearboxes and axle tubes for both front and rear. They aren't necessary (the stock Tamiya gearboxes and axle tubes will work well), but they look really cool.

Touch Setup™ feature is also a plus.

Because the twin motors and huge tires could put a strain on just about any ESC, I asked Novak if I could try out their bolt-on ESC cooling fan. It's a very simple item that gives your ESC a little life-insurance policy by working overtime. Two Schottky diodes were soldered onto the two motors once they had been bolted into place.

For my radio gear, I tossed in a Novak NER-3 FM receiver and a Futaba* PCM 1024. My PCM has, time and again, proven to be one of the most reliable, easy-to-use FM radio systems on the market.

Providing power for this beast is the same battery pack as I used the first time around—a Trinity* 9-cell 1700 SCRC Pro-Pack, which provides plenty of horsepower.

MISCELLANEOUS MODS

In the pictures, you may have noticed that the truck is equipped with a prototype anti-sway-bar system; it prevents unwanted body roll during cornering. It also allows you to run the truck with softer suspension, which makes the truck less "springy" so that it doesn't bounce all over the place. The system also helps the truck flatten out better when it lands off jumps. It looks as though this unit will be in production by the time you read this article.

ESP's aluminum servo-savers ensure that my JR servos aren't bashed around in any way. You can eliminate spring action by locking the servo-savers; just remove the unit's spring and the long bolt, and replace it with a short 4-40 bolt.

I was really impressed with Pro-Line's* Clod tires, so I used them again on this project. I mounted them on a stunning set of JPS aluminum wheels.

ESP's twin-tube lower bumper protects the front end in case I get out of shape while I'm driving. (Gee, I can't see that happening.)

Last, but not least, I again used a Dahm's* Commando XL8 body, and our good paintin' buddy Scott Bich, of Bich'n Bodies*, provided the awesome paint job.

PERFORMANCE

Because I had driven my Project Big Truck, Part 1 so much, I thought I knew what to expect

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when I first took this new truck out for a spin. I charged up my pack and took the truck out to a parking lot. I wanted to test how easy it would be to tip it over on a high-traction-type surface, because I remembered that when I drove the 'zilla II at full speed on the pavement, it felt very "tippy." Well, I was surprised when I nailed the throttle while turning. Any other monster truck—stock or modified—would have experienced some sort of "tippiness"; but this truck felt as though it were a planted, parking-lot-racing car. The truck's low CG works with the anti-sway bar and really helps this truck to weave all over the parking lot as if it were on rails. I noticed little, if any, tendency to roll over.

I nailed a few curbs to check out how this sucker would jump. Eric was right: the anti-sway bar really does help to smooth this truck out over bumpy terrain and jumps.

Out in the dirt, the truck clawed at the earth like the true monster that it is. Project Big Truck, Part 2 really hauls, and it climbs hills with ease; the 19-turn doubles were the perfect choice.

Performance-wise, I have to say that the Clodzilla III chassis, with all the mods that I've talked about, handles better overall than the 'zilla II. It turns faster and tighter and, thanks to the sway bar and softer suspension, you get a much smoother ride. If you're in the market for a new monster truck kit, you should seriously consider checking out this one.

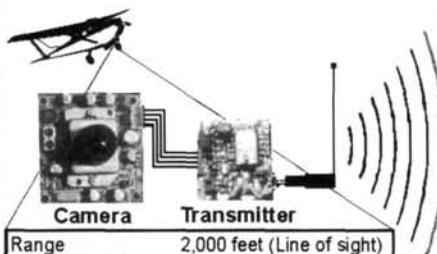
I'd like to thank Eric Sutcliffe and Bud Christensen for all their help in getting me and this Project Truck up to speed. Without them, it wouldn't be here before you.

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LETTERS

(continued from page 10)

to better our hobby. Dare you to print this.

BILL CAMPANARO
Waterbury, CT

Bill—Bill—Bill...you're breakin' my heart.

First of all, I'd like to thank you for the compliments. Now I'd like to move directly to the fact that you're missing the point...again! Let's take your statements one at a time.

- *"I do not feel it is up to us, as consumers, to have to get these programs up and running."* Bill!—these programs (Kyosho's, Tamiya's, Bolink's and Trinity's) are all ready to go. All you're being asked to do is go into your local hobby shop and tell someone you're interested. How hard can that be? Next, you'll be complaining that you need someone to race your car and clean it off for you.
- *"Let's face it. This hobby is expensive, no matter what level you are."* Bill, if you're at the Bolink Legend "level," you're talking a \$50 car. How much cheaper do you want things to get?

• *"The manufacturers owe the consumers something back."* You're right; they do. And they've started to give it back with cost-efficient race programs and dealer incentives. It's really all there now, Bill; take a closer look.

- *"I would suggest to Chris that Car Action also consider getting involved in the issue. May I suggest that Car Action take a leading role here in Connecticut by using its knowledge and influence to sponsor various types of recreational racing programs to promote our hobby."* We do our part, Bill. Our responsibilities are on a national level. We already co-sponsor some of these programs, and we cover what's happening nationally. Add to that the new "Grassroots Racing" column, which focuses heavily on the CCR (cost-controlled racing) programs currently offered. As for taking the local responsibilities into our own hands, we are not the parks department. The racers and the dealers have to take some initiative. We can't do it all for you.
- *"Chris—not all your readers are kids."* (This refers to my comment, "Stop whining and start demand-

ing."). Bill, I wasn't referring to kids. Look, I don't want to start a feud in the "Letters" section here. I know exactly from whence the butter cometh. Look around, many CCR programs exist now, and they are backed up by dealer incentives to boot. Now, people like you and the dealers have got to get together and say, "Hey, we want this here; let's make some calls." If you don't, then you're part of the problem, too. If you don't, these programs will go away because of lack of interest.

To put it another way, *Car Action* can't supply you with a used hose to make your own parking-lot track layout. You have to call your local fire department, Bill. Don't expect someone else to do it for you. John Huber called for us; now we have all we can use. Do something! You can forget about having it all done for you. You dared me. —Chris

National Organizations

ROAR

Radio-Operated Auto Racing
Contact: Steve Whitney, Administrator
1056 Red Bud Circle
Rockledge, FL 32955
(407) 631-5857

NORRCA

National Organization for Racing Radio-Controlled Autos
Contact: J.R. Sitman, Administrator
1651 W. Foothill Blvd.,
Suite 292
Upland, CA 91786
(909) 944-5381
(909) 944-2996 fax

NRCTPA

National Radio-Control Truck Pulling Association
Contact: Don Hubert, Administrator
2321 Greenwood Ct.
Champaign, IL 61821
(217) 359-7628

From the track to the parking lot.
This is the R/C action as **you** see it.

by Chris Chianelli

Grassroots RACING

This is YOUR PAGE—YOURS!! It belongs to you: the R/C car enthusiast who loves to race with friends and family; the optimistic racer on a budget who's looking to do some evenly matched CCR (cost-controlled racing); the individual who's in it for the greater fun of it all—the grassroots racer. I promise you one thing: you'll never see a sponsored racer's name on this page unless it's to tell how a local hero kicked his butt. We at *Car Action* want to

see what's going on and how you're organizing races at your local track, hobby shop and parking lot.

This month we have a guest writer—Mike Meyers. If you'd like to be a guest author, send in a completed story, 300 to 500 words, about your race club. If we use it in its entirety you'll get credit and a free year subscription to *Car Action*. Don't forget the photos!—snapshots, 35mm slides, Polaroids, almost anything will do.

A special sidebar will address upcoming races, and, in a subsequent issue, you'll see the local hot "trigger-fingers" who won those races. Remember: big sponsors are always watching, hoping to find the next world champ at a local track.

To the right are the phone numbers of hobby dealers, chains and distributors that have already set up CCR programs. Give them a call!!

call now!

If you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here's a few hot-line phone numbers that you can use if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series

(404) 963-0252

Tamiya R/C Championship Series

(800) TAMIYA-A

Kyosho R/C Sport Racing

(800) 682-8948, ext. 085F

Hobby Shack Parking Lot

(714) 964-8846

Hobby Town USA Parking Lot

(402) 434-5050

Trinity's Street SPEC Series T.B.A.

Miami, FL,
December 11—52
R/C racing
diehards brave
southern Florida's
stormy weather
to compete in the
Tamiya
Championship
Series' race no. 9.



Monsoon in Miami

Sunday opened with heavy rain that soaked the track and the contestants. A considerable amount of drying out time was required—with the help of squeegee-equipped volunteers. It rained for only an hour and a half, and after that, all went smoothly until the end at 4:00 p.m.



Left: winners in 4WD Sedan Modified (left to right): Ed Delgado—winner; Rick Schwartz—second; and Mike Contreras—third.



Right: winners in F1/Indy Stock (left to right): David Franklin—winner; Richard Weeber—second; and Kenneth King—third. Congratulations!

Cabin Fever in Michigan

by Mike Myers

WITH SEVERAL INCHES of snow outside, it's too cold for any kind of R/C racing, so everyone has moved indoors until the temperature gets more civilized. That's not as bad as it may seem, though; there are plenty of indoor carpet tracks and even an indoor dirt track!

To me, grassroots racing means getting back to the basics, not using high-tech equipment and running R/C cars that anyone can afford—not cars that require a mortgage just to make the down payment. It means that people with average cars can compete and have fun. That's what R/C racing is really about, right?

The first thing we wanted to do was to set up a separate class so that inexperienced racers could compete and see how much fun R/C racing could be. We came up with the Rookie Class.

The rules for the Rookie Class are very simple: there are no rules. New racers can use any kind of R/C car, any motor, any body and any tires.

(knobbies must have the knobs cut off so that they won't damage the carpet). The goal of



the Rookie

Class is to teach new racers how to control their cars on a track, which is something that should be learned for fast driving. We decided that a first-place ribbon would be awarded to every racer whose car was still running at the end of the 4-minute Main. It was strongly suggested that the cars be set up with the slowest motor available, with the speed control dialed down to the slowest position and with four, rather than six, cells. This would prevent new racers from losing control and crashing their vehicles. Rookies who finish the race not only get a first-place ribbon, but they also get a certificate with their name on it. When they collect five certificates, they "graduate" into the regular racing classes, and they're awarded one free race.

We've been doing this for only a few weeks now, so it's really too early to say how well it's



At the Lansing track, the Transmission Class is halfway around the first lap.

all going

to work out. The first track to offer the Rookie Class was JJ's R/C Speedshop (a full-time race track in Detroit). The Lansing R/C Cars Club that provided indoor racing during the winter months in a rented hall in Lansing, MI, is also getting involved, as are other clubs and tracks. JJ's is a permanent track, while the track in Lansing is set up early on Friday evenings and packed away when the night's racing is finished.

After a few weeks, several things became apparent:

- The Rookie Class had attracted a whole new group of racers. The participants at JJ's weren't racers who had switched to a different class; they were new racers who had yet to become very involved in R/C racing.

- Most of the cars were going too fast. By the end of most races, there weren't that many cars still running. This led the crowd of spectators to cheer on the few remaining racers, encouraging them to, "Just take it easy and finish, and you'll get that ribbon!" As this program continues, I hope to see fewer

crashes and more racers who finish the races.

- It was very helpful when a more experienced racer got up on the driver's stand next to a rookie and offered suggestions and encouragement.

Several other local tracks are getting involved with grassroots racing and are looking into starting a Rookie Class. The next report will cover what's happening in the Rookie Class and in some of the other new classes, including the Legend Class. Stay tuned. ■



Above: Josh Filak accepts his first-place ribbon from the "Less than Five Girl," Karen Shaftner. Josh raced a Bolink Digger that was set up to go slow. Left: a look at JJ's track and a few of the Winston Cup racers. Below: Rookie-Class racing at JJ's.



Tech HEAD

by Frank Masi

Mechanical musings & stuff that didn't fit last month

This month's column contains a bunch of stuff that I couldn't fit into last month's column. Some of it has to do with gearing, and the rest is made up of interesting items I came across while researching the mysteries of gear ratios.



RPM's molded gear cover for the RC10.

SMALL PINION GEARS

What's the smallest pinion gear you should use? As the diameter of a pinion gear becomes smaller, the relationship between each of its teeth changes to the extent that the pinion will no longer mesh properly with the spur gear, which has a

much larger diameter. Looking at Figure 1, you'll see that, although distance X stays the same, distance Y (the distance between the tops of the teeth) becomes greater as the pinion's diameter becomes smaller. For this reason, most experts don't recommend the use of a 48-pitch pinion gear that has fewer than 17 teeth. If you can't get the proper gear ratio for your car or truck without resorting to using a pinion gear that's too small, switch to a larger spur gear.

Regarding gears of different pitches, i.e., 64- and 32-pitch, the smaller the tooth size, the smaller the gear diameter may be before improper mesh occurs.

GEAR NOISE

Have you noticed that some gears—even new ones—make more noise than Ad Rock hitting a high note? Believe it or not, buying new gears might not be the answer. Almost every gear manu-

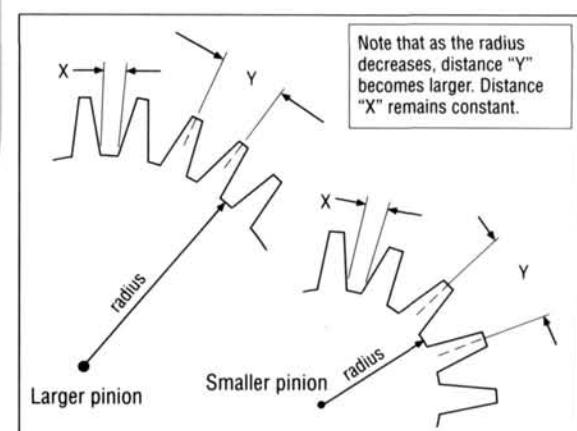


Figure 1. The effect of gear size on tooth mesh.

facturer has his own gear tooling made, so although the basic specifications (tooth size, pitch, etc.) of every gear may be the same, if they're from different companies, the gears may be incompatible because the teeth profiles differ slightly. Oh, don't worry; if you use gears made by different companies, they'll work well enough, but if you want really quiet pinion and spur gears that mesh perfectly, be sure to use ones made by the same manufacturer.

Strange noises aside, I've noticed that a Team Losi car sounds different from a Team Associated car. Now, why is that? I found out that the tranny case and the motor-mounting plate (because of their size, shape and what they're made of) act as resonators and amplify the noise of the rotating gears. The same is true of the outer gear cover. Try this: swap your Lexan

gear cover for a molded nylon RPM* cover and listen to how the car sounds when you drive it—see?

Here's a trick used by Team Losi's Jack Johnson. He claims that he and other team drivers make the internal gears of their Double-X transmissions run more smoothly and quietly by using Aero-Car's* Super Speed gear lube. Simply brush the lube onto clean gears, spin them, and you're ready to go. Jack says this stuff works great.

TIRE EXPANSION

While I was researching my last column, an interesting question arose: when an off-road car using very soft-compound tires travels down a straightaway at full power, do its tires actually expand enough to affect the car's final drive ratio? If they do, it would be kind of like having a 2-speed transmission: larger diameter tires would significantly lower the gear

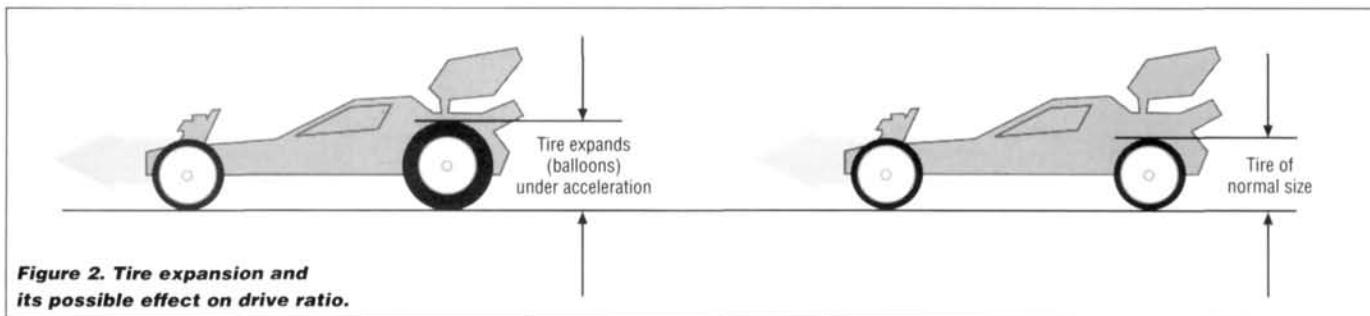


Figure 2. Tire expansion and its possible effect on drive ratio.

ratio, just like using a larger pinion gear (see Figure 2). Does this really happen? The jury is still out. No one seems to be sure whether the tires actually expand, or merely change their "footprint" owing to the weight of the car, momentum, etc.

Some authorities claim that tire expansion can cause a car to push when exiting a turn. As the car corners, it leans, thus transferring most of its weight to the outside tires. The inside rear tire, with very little weight on it, will tend to expand (balloon) as throttle is applied. The effect is similar to that of tire stagger in oval racing, but in this



Aero-Car's Super Speed gear lube.

case, the larger inside tire pushes the car in a direction that's opposite to the turn.

In my next column, I'll write a bit about slipper clutches: how to set them and the effects of transmission ratios on their settings. If you have a topic you'd like to see covered here, please write to Tech Head, c/o R/C Car Action, 251 Danbury Rd., Wilton, CT 06898, or e-mail me at frankm@airage.com (title it "Tech Head").

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RPM, 14978 Sierra Bonita Lane, Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.

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SCI Power Corp., P.O. Box 13099 Airgate Station, Sarasota, FL 34278-3099; (800) 673-9563; fax (813) 351-9700.

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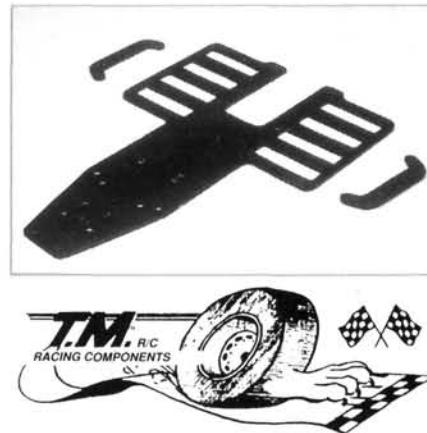
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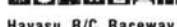
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Frank's Hobby House, 19401 N. Cave Creek Rd., Phoenix, AZ 85024; Marty, (602) 992-3495



G&S Raceway, 967 Hancock, Bullhead City, AZ 86442; Bob Olsen, (602) 758-1100



Havasu R/C Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu City, AZ 86404; Bernie Coates, (602) 855-2966 or (602) 855-4666



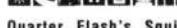
HobbyTown Raceway, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250; Dennis, (602) 948-3946



HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234; Kenny, (602) 892-0405



HobbyTown Raceway, 2814 W. Bell Rd., Phoenix, AZ 85023; Mike Kaminski, (602) 993-0122



Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave or Randy, (602) 625-9274



R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671



Speedway Hobbies, 1000 N. Humphreys St., #204, Flagstaff, AZ 86001; Gary McAllister, (602) 556-0710



ARKANSAS

Arkansas Int'l. Superspeedway, P.O. Box 1636, Pine Bluff, AR 71613; Joe Pitts, (501) 247-2371



Performance Hobbies, 2222 Spence, Jonesboro, AR 72401; Rick Womble, (501) 935-6501



CALIFORNIA

Cats West/Hawk's R/C Raceway, 1201 West 10th St., Antioch, CA 94509; Jerry Winkelbauer, (510) 779-1665



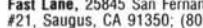
City Speedway, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633



Cloverdale R/C Raceway, 1 Citrus Fair Dr., Cloverdale, CA 95425; Tom Kelley, (707) 586-9789; track, (707) 894-4468



Fast Lane, 25845 San Fernando Rd., #21, Saugus, CA 91350; (805) 254-2404



Frogtown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



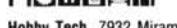
Greater Los Angeles R/C Racing Club, California State University, Parking Lot A, Los Angeles, CA 90045; Glenn Williams, (213) 734-7888 or Tom Wong, (310) 821-5472



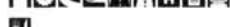
Hobbies Emporium, 1324 Vendels Cir. #111, Paso Robles, CA 93446; Rick Powers, (805) 239-0408



Hobby Haven Raceway, 3983 First St., Livermore, CA 94550; Tom Welding Jr., (510) 443-5828



Hobby Tech, 7932 Miramar Rd., San Diego, CA 92126; Henry Moller, (619) 586-1701



Hobby Warehouse, 5500 So. Watt, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587



Jake's Performance Hobbies, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375



JC High Desert Raceway, Gorgonio Rd., Phelan, CA 92329; JC Fletcher, (619) 868-4834



Valley R/C Race Park, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 654-1505 or 658-4322



Victory Speedway, 22960 Victory Blvd., Woodland Hills, CA 91367; (818) 888-9000



JD Hobbies, 1009 W. College Ave., Santa Rosa, CA 95401; Mike, (707) 571-1700



K&M R/C Raceway, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899



KW Raceway, 5630 Ager Rd., Montague, CA 96064; Keith Wilson, (916) 459-3787



Lodi's Radio Control Speedway, 1033 Black Diamond, Ste. B, Lodi, CA 95240; Mike Belanger, (209) 334-5681



Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603



R/C Off-Road Raceway, 10810 Talbert Ave., Fountain Valley, CA 92708; Jeff Paul or Bob Fiege, (714) 965-9615



R/C Racing Center and Hobbies, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County); Russ or Cindy Escalera, (619) 443-2270



R/C Sports, 759 E. Monte Vista Ave., Vacaville, CA 95688; (707) 446-5555



Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800



RAMS, Murco Plaza, Paseo Padre Pkwy. & Mowry East, Fremont, CA; Mike Alton, (510) 490-8734



RCRC Hobbies, 2069 Pacific Coast Hwy., Lomita, CA 90717; Rhea & Cliff Fisher, (310) 530-7272



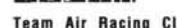
So. Cal R/C Raceway, 11930 Valley View St., Garden Grove, CA 92645; Jim Blauvelt, (714) 892-0088



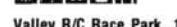
SLO Hobbies, 1356 Madonna Rd., San Luis Obispo, CA 93405; Jim or Ernie, (805) 541-8524



SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488



Valley R/C Race Park, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 654-1505 or 658-4322



B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1866



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



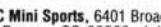
Wendy's Country Store and More/D.R.C.A. Racing Club, 5475 Skyway, Paradise, CA 95969; Alan Evans, (916) 872-9363



MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151



Miracle R/C Speedway, 4206 Wadsworth Blvd., Wheatridge, CO 80034; Rob Grossman, (303) 420-3051



R/C Mini Sports, 6401 Broadway, Unit G, Denver, CO 80223; John Weins, (303) 426-0110



R/C World & Track, 4415 S. Newton St., Denver, CO 80236; (303) 789-0838



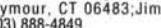
S&T R/C Raceway, 323 Auburn Dr., Colorado Springs, CO 80909; Tim Bishop, (719) 574-2910



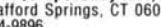
CT R/C Off-Roaders, behind Old Field School, Fairfield, CT 06430; Mike Belmonte, (203) 661-0145



JP's R/C Hobbies, 200 S. Main St., Seymour, CT 06483; Jim Petzold, (203) 888-4849



K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



NERCAR, 36 Glendale Rd., Enfield, CT 06082; Phil Olsson, (203) 627-5410

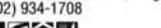


R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501



DELAWARE

4E Hobbies, 113B West Dupont Hwy., Millboro, DE 19966; Peggy Evans, (302) 934-1708



FLORIDA

B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1866



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Red's R/C Raceway & Hobbies, Etc., 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330



River City R/C Car Club, 9711 Sharien Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143



Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744



Three Flags R/C Racetrack, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870; fax (904) 748-5263



Treasure Coast R/C Club, 4931 Oceanside, Port Pierce, FL 34982; Lou, (407) 464-3207



West Coast R/C Club, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554



GEORGIA

Carnesville R/C Speedway, Hwy. 145 S., Carnesville, GA 30521; Bill or Georgia Austin, (706) 335-9044 or 335-3381



Chafee Park Raceway, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929



Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 228-6699



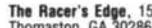
Echeconee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline, (912) 788-8731



Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



PDQ Raceway & Hobbies, 341 Senoia Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788



The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637



Sandy Cross Speedway, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; (404) 991-2225



Sugar Bowl R/C Speedway, 5272 North Ave., Sugar Hill, GA 30518; Shelley or Jan Bailey, (404) 945-6709



HAWAII

Garden Isle R/C Racers, P.O. Box 3593, Lihue, HI 96766; Eric Leano, (808) 246-8856



IDAHO

Capital Dirt Burners, 1945 N. Teare Ave., Meridian, ID 83642; Jim Brandon, (208) 888-7079



Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



ILLINOIS

AJ's Raceway, Kesslinger Road, DeKalb, IL 60115; AJ. Schultz, (815) 576-2772



BARR, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



C&R Hobbies, 39 E. Jones, Miford, IL 60953; Ray Craighead, (815) 889-4073



Cedarville R/C Speedway, 430 W Washington, Cedarville, IL 61013, Troy Pokoj, (815) 745-2885



Centennial Park/LeMont Dirt Burners, 7827 Rohrer Dr., Downers Grove, IL 60516; Scott Moravik, (708) 968-6411



Central Illinois Max Track, 1013 Iowa St., Ashmore, IL 61912; Josh Carter, (217) 349-8824



Diehard R/C Raceway, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700



Hobby Town Raceway, 4611 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



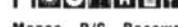
Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gall or Marty, (815) 933-8441



Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597



Peoria R/C Raceway, 518 Hillsdale Ave., Peoria, IL 61604; Ray Tigue, (309) 672-1780



Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (708) 759-7557



Redline Raceway, 921 Harding Calumet City, IL 60409; (708) 862-8181



Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030



SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



Slot and Wing Hobbies "Race Place", 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Super Stock Speedway, 54 Bonnenstiehl, Collinsville, IL 62234; Thomas Smith, (618) 632-2615



INDIANA

Autograph/Race World, 231 Pendleton Ave., Pendleton, IN 46064; Sam Mudd, (317) 778-3386



Blaze's Race' n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 857-1324



Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353



Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060



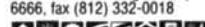
Main Hobbies, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045



Maple City Speedway, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827



P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, fax (812) 332-0018



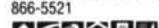
RC Barn, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Racer's Choice Raceway, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250, Eric Burns, (812) 866-5521



Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)



The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



West Kentucky R/C Hobbies, 45 Hawkins Loop, P.O. Box 21, Symonia, KY 42082; (502) 851-3534



Taylor's Big Raceway, 800 S. Southport Rd., Indianapolis, IN 46227; Tim Taylor, Corey Adams or Chad Smith, (317) 882-0524



Red Dirt Raceway & Hobbies, 324 Pittkin Rd., Leesville, LA 71446; C.J. Hall, (318) 535-9238



T&M Pro Hobbies, 9212 W. Judge Perez Dr., Chalmette, LA 70043; Tom/Melodie Barthel, (504) 271-3111



MAINE

Central Maine R/C Speedway and Hobbies, 18 Lithgow St., Winslow, ME, 04901; David Prescott, (207) 877-2232



Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003



Mementos Hobby Shop, 86 Sweden St., Caribou, ME 04736; (207) 498-3711



MARYLAND

Cockeysville Astrodome Racers, 10854 York Rd. (rear), Cockeysville, MD 21030; Steve Balaz, (410) 666-2521



The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630



Wetland Hobbies and Raceway, 2072 Crain Hwy., Waldorf, MD 20601; Perry Pritchard, (301) 870-0293



MASSACHUSETTS

Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244



Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373



North East Auto Racers, 4 Graf Rd., Newburyport, MA 01882; Dave Thibault, (508) 699-9587



R/C Hobbies & Speedway, 16 Rio Way, Fairhaven, MA 02719; Toni or Roy, (508) 991-5040



West Street Hobbies, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231



MICHIGAN

Can-Am Hobbies Speedway Park, 1152 Gratiot, Marysville, MI 48040; Don Grinde, (313) 364-3338



Chatter Box Racing, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829



Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368



JJ's R/C Speedshop, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420; fax (810) 977-7290

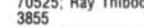


Ludington R/C Raceway, 1483 N. Dennis Dr., Ludington, MI 49431; (616) 843-4654



LOUISIANA

Cajun R/C Raceway, Rt. 2, Box 288 (Hwy. 343, Bosco) Church Point, LA 70525; Ray Thibodeaux, (318) 873-3855



TRACK DIRECTORY

Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (906) 293-3044



Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; (517) 773-5711



R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744



Scale Racing Center, 3432 Highland Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529



TA Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 790-3217



Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Orikowski, (616) 791-9902. (Open May through August)



MINNESOTA

Badger R/C Raceway, 404 Tamarack St., Box 101, Badger, MN 56714; Keith Cumming, (218) 386-2001



C/S Speedway, 312 N. Bdwy., Crookston, MN 56716; Caesar Kaiser, (218) 281-6665



Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751



Greater Minnesota Racin' Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Larry's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246



Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



Paul Bunyan Raceway, Rte. 1, Box 468, Bernie, MN 56664; Brad Trask, (218) 243-2749



Range Racing World R/C Speedway, 412 Jones St., Eustis, MN 55734; Bill, (218) 744-4423



Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233



Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Oftelie, (612) 644-3424



Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248



MISSISSIPPI

Crossroads Raceway, 904 Cass St., Corinth, MS 38838; Ronnie Inman, (601) 287-7169



Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315



Joe McFaden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFaden, (601) 483-7000



Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



MISSOURI

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767



ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371



Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randal, (816) 358-0238



Extreme Edge Speedway, 119 W. Liberty St., Farmington, MO 63640; Ken Boren, (314) 756-4122



Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Bonville, Springfield, MO 65082; Juan Montell, (417) 725-4337



Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Ozark's R/C Raceway, Hwy. 13, Brighton, MO 65781; Gene Rhodes (417) 742-4376 or Ron Hawkins, P.O. Box 460, Willard, MO 65781, (417) 742-2561



Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828



MONTANA

Bozeman R/C Powerhouse Track, 2825 W. Main (west side of Main Mall), Bozeman, MT 59715; (406) 586-0071



Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569



NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865



River City Racing, Aksarben Field, Sales Pavilion, Omaha, NE 68164; Robert Conner, (402) 431-0482



The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414



Wild Card Raceway, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743



NEVADA

Radio Controlled Race World, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882



NEW YORK

A&D's FasTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065



Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577



NEW HAMPSHIRE

Economy R/C Speedway, 4 Maple St., Winchester, NH 03470, Harold Thomas, (603) 239-4482 or 239-6470



Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



Lake Region R/C Speedway, Lily Pond Rd., Laconia, NH 03246; Louie Blais, (603) 524-2909



Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193

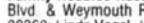


NEW JERSEY

Bob's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisco, (908) 446-3737



Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790



Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438, (201) 697-7525



LBRA Track, 392 Warburton Pt., Long Branch, NJ 07740; (908) 222-5122



Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)



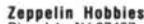
The Race Place, 1151 Hwy. 33, Farmington, NJ 07731; John Fary, (908) 938-5215



Spernall Speedway, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191



On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

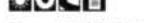


Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717



NEW MEXICO

Las Cruces R/C, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962



Meerscheidt R/C Raceway Park, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 326-1758



NEW YORK

R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14452; (716) 425-3722



Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456



Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616



Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224



Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194



Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859



Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140



Chipmunk Hill R/C Speedway, Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065



Competition Hobby Supplies, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 786-3622



East Coast Barn Stormers, MD #1 Old Oxford Rd., Chester, NY 10918; Michael or Lou, (914) 469-8206



East End Off-Roaders, 7335 Main Rd., Mattituck, NY 11952; Wally, (516) 298-2020



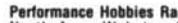
Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940



LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



1/10 Raceway and Hobbies, 168 Broad Hollow, Farmingdale, NY 11735; George or Dora, (516) 845-5211



Performance Plus Radio Control Speedway/The Hobby House, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772



Peter's R/C Raceway, Rte. 36, Leicester, NY 14481; P. Gerald Scorsone, (716) 382-3126



R/C Competition Corner, K-Mart Plaza, Matthydale, NY 13211; (315) 455-8718



R/C Hobbies, Rte. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536



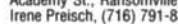
R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722



Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456



Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



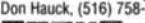
Small Torque Racers of Long Island, 24 Horton Dr., Huntington Station, NY 11746; George Franz, (516) 271-1119



Speedworld R/C Raceway, Rte. 12, Chenango Forks, NY 13746; Mike Magnusson, (607) 648-2063



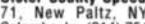
South Shore Hobby & Raceway, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



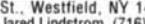
Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368



Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664



Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339



Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



NORTH CAROLINA

The Antique Barn, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Limpasol, (919) 237-6778



Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407



C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27311; Steve & Mary Cox, (910) 495-3482



C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321



Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (919) 762-1184



Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569



Carolina Hobbies R/C Raceway, Route 1, Box 158, Taylorsville, NC 28681; Kim & Roseanne Kulawik, (704) 495-4040



PROTOform RACE BODIES

THE HITS JUST KEPT ON COMING

When I think about the 1994 racing season, the first thing that comes to mind is: "The hits just kept on coming." No, I'm not talking about tunes from my favorite radio station; I'm talking about race wins around the world. It seemed as if, every Monday, I'd be greeted by phone calls and faxes informing me that a major race had been won somewhere and that PROTOform bodies had been used. It's not a bad way to start your week. News like that gets me inspired.



The year was barely two weeks old when Frank Polimeda won the $\frac{1}{2}$ -scale Main at the WINTER BLAST at K/N Raceway. What made this race so special for me was that it was the best-attended indoor race in R/C history. Frank not only won, but he also set the track record using a new '94 T-Bird body that was only put into production three days before the race. Frank continued to barnstorm the eastern half of the country, setting track records almost everywhere he raced.

Frank closed the 1994 season in the same way as he started it—winning! CEB Raceway hosted the hotly contested ROAR Carpet Oval Nationals, and once again, Frank used a brand-new body style from PROTOform to win the A-Main. He used the new 1995 Monte Carlo body on ho EV10, as did the TQ and track record holder Todd Putnam. In the four A-Main races, more PROTOform bodies were used than all other brands combined.

Meanwhile, on the same day on the "left coast," NORRCA hosted their final event of the year at the Domingus Hills velodrome (home of the Thunderdrome). PROTOform team driver Steve Saik was top qualifier, and Greg Lawson won the A-Main using the PROTOform Olds Cutlass.

Velodrome-style racing is a real test of how efficient a body is aerodynamically. It has been almost two years since Kent Bowers did the first ever 19-lap run at the "drome." Since then, only a handful of racers have been able to accomplish this feat, but in every case, a PROTOform body was used.

Throughout the year, it was exciting to hear of our products being used to win national titles in Switzerland, Sweden, Germany, Norway, Japan and America. Another fall race that was a huge success for us was the $\frac{1}{2}$ -scale '94 U.S. Indoor Championships. At this race, six out of 10 in the Masters A-Main and seven out of 10 in the Modified A-Main used the PROTOform P-35 Nissan. Mike Blackstock TQ'd and Jon Orr led a 1-2-3 sweep for PROTOform in the A-Main!

Thanks guys! We'll keep working hard to bring you the BEST race bodies!

PRO-LINE / PROTOform

RACING TO BRING YOU THE BEST!

Clapp's R/C Motor Speedway, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-3198



Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbitt Marshburn (919) 592-9489



Hobbies, Etc., 5540 Atlantic Springs, Raleigh, NC 27604; Don Asplen, (919) 790-1444



Hobby Park Dragway, W. Clemmons Rd., Winston-Salem, NC; Jack Wright, (919) 983-9416



Hobby Park, W. Clemmons Rd., Winston-Salem, NC 27103; Dick Butler, Parks & Recreation, (919) 727-2063



Motorlead R/C Raceway, 125 Park St., Canton, NC 28716; (704) 648-7911



Ride & Slide R/C Raceway, 5319 Yaddin Rd., Fayetteville, NC 28303; Jim Woodman (910) 425-5276 or Bill Culbertson (910) 867-4202



Rosewood Speedway, Rt. 5, Box 853, Goldsboro, NC 27530; Glenn Elam, (919) 731-4734



S&B Speedway & Hobbies, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422



Sandhills Raceway Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Winston R/C Drag Series, W. Clemmons Rd., Winston-Salem, NC 27106; Jack Wright, (910) 922-3800



NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419



Northern Mini Racers, 2105 North Broadway, Minot, ND 58701; Patrick McWethy, (701) 839-8868



Valley Hobbie, 1519 1st Ave. South, Fargo, ND 58103; Craig Sturm, Keith Johs, (800) 493-9971



OHIO

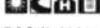
Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300



C/R Hobbies/Top Race Track, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266



D&S Hobbies Raceway, 7701 C.R. 18, Concord, OH 44077; (216) 354-2112



Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589



Hobby Mania Raceway, 6597 Route 224, Lowellville, OH 44436; (216) 536-8282



RACING TO BRING YOU THE BEST!

PRO-LINE/JACO

The Pro-Line/JACO assault on the on-road racing scene continues! Our tires have been winning races and setting records all over the country. From coast to coast, more people are choosing Pro-Line/JACO to go racing than ever before—and for good reason: Pro-Line/JACO tires area great value. We manufacture high-quality tires at a fair price, and they work right out of the package.

AVAILABLE IN APRIL, 1995 PRO-LINE/JACO 1/12-scale tires

We congratulate these drivers and thank them and all the other racers who chose Pro-Line/JACO tires.

1994 NORRCA ON-ROAD NATIONALS

1/10 Modified TQ and winner—Barry Baker
1/12 Modified winner—Kevin Jellich

1994 INDOOR CHAMPIONSHIPS—CLEVELAND

1/12 Stock TQ—Jeff Brown
1/12 Modified winner—Jon Orr

1994 ROAR CARPET OVAL NATIONALS

1/10 Stock TQ and winner—Mike Dunnigan
1/12 Stock winner—Keith Steinal
1/12 Modified TQ—Frank Polimeda
1/10 Modified winner—Frank Polimeda

Pro-Line/JACO Racing Hint #1

The next time out, try our Red compound (#2123) tire on the right front of your oval car. Low wear combined with excellent bite makes this the ideal choice for high-speed oval racing. Just ask Frank Polimeda; he used a Pro-Line/JACO Red right front to TQ in 1/12-scale Modified and win 1/10-scale Modified at the 1994 ROAR Carpet Oval Nats.

Pro-Line/JACO Parking-Lot Hint #2

For all surfaces, try our Purple compound (#2254) trued donuts on the front of your F1 or Indycar. On the rear, try a pair of Pink compound (#2255) or White (#2253) trued donuts. They provide the ultimate traction on asphalt and under most other racing conditions.

JACO

PRO-LINE

P.O. Box 456, Beaumont, CA 92223;
(909) 849-9781; fax (909) 849-2968

TRACK DIRECTORY

PENNSYLVANIA

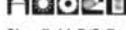
Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonelli, (814) 849-7385



CED Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045



Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585



Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (215) 269-1300



Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



Mt. Laurel Speedway, 835-8 Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850



Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744; Bob (215) 945-0325



Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19010; Bob Paulavage and Don Fewkes, (610) 622-7651



R/C Speed Shop & Raceway, 2122

Platt Springs Rd., W. Columbia, SC 29169; Eric Prevost, (803) 791-4715



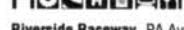
Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



R/C Pro Speedway, Milville Rd., Bloomsburg, PA 17815; Norm Swisher, (717) 387-0266



RCD Raceway, 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



Riverside Raceway, PA Ave. W. & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260



S.A. Hi Banks, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123



Sinking Spring Race Center, 237 South Hill St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760



South Mountain R/C Speedway, 357 Furnace Rd., Wernersville, PA 19565; George Merkel, (215) 267-4736



Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



TC's R/Cs, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coriale, (412) 226-8802



T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604 or Frenchie (607) 775-1756



Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877



PUERTO RICO

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083



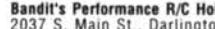
RHODE ISLAND

Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908

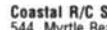


SOUTH CAROLINA

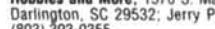
Bandit's Performance R/C Hobbies, 2037 S. Main St., Darlington, SC 29532; Bryan Howle Jr., (803) 393-3333



Coastal R/C Speedway, 8553 Hwy. 544, Myrtle Beach, SC 29577; Wendel Smith, (803) 236-9309



Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355



R/C Speed Shop & Raceway, 2122

Platt Springs Rd., W. Columbia, SC 29169; Eric Prevost, (803) 791-4715



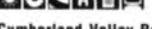
SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604



TENNESSEE

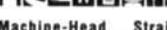
Action Hobby Shop, 3723 S. Mendenhall, Memphis, TN 38115; Brian Stricklin or Justin Austin, (901) 365-2620



Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 37015; Jamie Pate, (615) 792-4371, ext. 1195



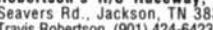
D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919



Machine-Head Straits, 938 Grandmire Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630



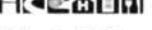
MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027



Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423



Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, R.R. 5 Box #652, Sparta, TN 38583, (615) 836-8450 or (615) 761-3407



Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763, Dwaine Romine, Kyle Romine, (615) 376-2330, 376-9955



TEXAS

Austin R/C Center, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144



Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Heinz Falke, (713) 399-1527



Hal's Hobby Raceway, 1440 Bessamer, El Paso, TX 79936; (915) 591-2213



Heart o' Texas Hobbies & Raceway, 309 W. Hwy. 190, Copperas Cove, TX 76522; Larry Gholson, (817) 547-7505



Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761



Indy R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006



Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett (409) 693-8095



Rivercity Speedway, 11731 Wetmore, San Antonio, TX 78247; Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652



Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105



TRACK DIRECTORY

Star Hobbies, 1200 Hwy. 100, Box 5, Port Isabel, TX 78578; Fred Carr, (512) 943-7546



T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562



Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401



Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224



UTAH

Fastrax, 355 N. 700 E., Price, UT 84501; Dave Johnson, (801) 637-6603



Hansen Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; Kevin Hansen, (801) 250-8303



Power Hobbies and Raceway, 135 N. 900 E., Suite 7, St. George, UT 84770; April Nutley, (801) 628-8747



VERMONT

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674



Mike's Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701; Stephen Rachlis, (802) 775-0059



Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321



VIRGINIA

Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758



Cooper's R/C Raceway, Rt. 4, Box 1228, Chatham, VA 24531; (804) 724-4182



Crossroads Hobbies R/C Raceway, 1104 W. Main St., Salem, VA 24153; Ronnie Black, (703) 387-3414



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Fairystone R/C Speedway, Rt. 4, Box 918, SR#353, Stuart, VA 24171; Pat Moon Jr., (703) 930-3984



The Hobby House, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333



KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596



Timberlake Hobbies, 1400 Atlantic Ave. #201, Virginia Beach, VA 23451; Doris Cruse, (804) 491-8016



Trackside Hobbies, 1314 E. Pembroke Ave., Hampton, VA 23669; Rick Cardwell, (804) 723-4170



WASHINGTON

Affie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638



Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (206) 491-2430



Hale's R/C Raceway Park, 10611 136th St. E, Puyallup, WA 98374; Walt Hale, (206) 845-7675



Home Town Hobby, 116 N. Main Ave., Ridgefield, WA 98642, (206) 887-1769



L&L R/C Raceway, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664



NORA Performance R/C, P.O. Box 955 (1673 Cedardale Rd.), Mt. Vernon, WA 98273; (206) 755-9464



Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Dave or Ron Steen, (206) 774-3285



Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838



Skagit R/C Raceway, 1689 Rounton Ln., Burlington, WA 98233; Jeff or Tim, (206) 724-3453



Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE



Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Nell Bade, (206) 565-1935



Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659



WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV 26456; Mark Travis, (304) 873-2487



Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355



WISCONSIN

ABC R/C, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245



Antigo Hobby, 311 Superior St., Suite 7, Antigo, WI 54409; (715) 623-7655



Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288



JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096



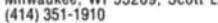
R/C Hobby Off-Road Track, Lewiston Lane, Viroqua, WI 54665; Dan and Diana Sawvella, (608) 637-8221



Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

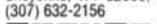


Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613



WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

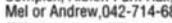


AUSTRALIA

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128



Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683



Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128



Belgium

Cartroubles Indoor Buggy Track, Jan Moonstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01

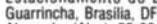


Model Racing Club Oudenaarde, Scheldekaat, 9700 Oudenaarde, Belgium; A. Chantier, 32-55-31-36-48; fax, 32-55-30-19-12



BRAZIL

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Garrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-61-273-7205



Hobby Center, SQS 210 Bl H Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488



Off Roaders, Av. Guillermo Dummont Villalba, 317, Sao Paulo, CEP 05640; Waldir Lelio, (055) 011-260-5628; fax (055) 011-831-4931



Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Correa, (031) 227-6111, fax (031) 227-6869



CANADA

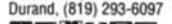
Action Weiz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756



ATN, Auto Teleguidee Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097



Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503



Circuit Pepsi, Centre de Location, 37 du Roi, Sorel, Quebec; (514) 746-8828



Circuit R/C Pro, 1500 Chemin Sullivan, Val-d'Or, Quebec; JPF 1M1; R/C Model Plus, (819) 874-3918



Circuit Teleguidee St. Roch, 363-B St. Charles, St. Roch De L'achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554



Club RCSI, 44 Rue Holliday, Sept-iles, Quebec G4R. Sylvio Gerard (418) 968-6575, hobby shop (418) 962-6565



CRCC, Box 309, Clinton, Ontario N0M 1L0; Eric Russell (519) 482-9429



East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262



Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084



Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



Hobbypro Raceways Ltd., 16020-132 Ave., Edmonton, Alberta T5V 1M1; Tony or Ian, (403) 455-RACE (7223)



Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 2R7; John Elliot, (519) 354-5530



Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC V2E 2A5; Martin Vanneuwenhuizen, (604) 374-1268, (604) 374-8458



J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



MORRAC Raceway, 6449 Crowchild Tr. SW, Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386



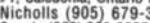
Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035



Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306



RC World, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nichols, (905) 679-3177 or Keith Seguin, (905) 388-9855



Renbo's R/C Racing, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Girou, (613) 936-0176



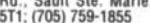
Rouillon Hobby Track, 177-D St-Jean Baptiste, Chateauguay, Quebec J6K 3B4; (514) 698-2151



South Okanagan Roadhogs, Skaha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698



Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855



Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361



Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santa Fe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588



Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santa Fe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588



Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892



Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691



Rainbow Raceway, Eriksvej 9, Glostrup, Copenhagen 2600, P. Christiansen, 45-42-88-504



Thor Minirace Odense, Sohusvej 255, Alleso, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707



DOMINICAN REP.

Adoca R/C Speedway, Feria ganadera, Santo Domingo; (809) 220-5266



La Barranquita R/C International Speedway, Santiago; (809) 582-2303



ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657



FRANCE

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763



Lorgies Bolides, rue Beau-Riuze, 62840 Lorgies, France; Mme. Hourdequin Sabine

**GERMANY**

MC Köln, Bottgerstr., Worrigen, Germany 50769; Ralf Habel, 02733-477493



Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609



Oberhausen-Altstadten, Am Fesderturn, Oberhausen, Germany 46099; Josef Holl, 0208-403676



Panik Raceway, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400299



Stoppelhopser, Oberhausen, Niebuhstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545

**GUAM**

R/C International Raceway, P.O. Box GK, Agana, Robert (Buddy) Simpkins, (671) 477-3207

**HONDURAS**

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras; Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

**HONG KONG**

H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822



Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

**INDONESIA**

Everly's Racing, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Mudik, 011-62-31-595-888

**ISRAEL**

Ircia Off-Road, Rahanana, Israel; Yaron Zafiris, (972) 030549937



Nahshoneat, Abba Niles Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252

**ITALY**

Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romilda, 015-405881; fax 015-922709

**JAPAN**

Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-61173-53-3662



Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506



Yokata R/C Racers, Yokata Air Base, Tokyo Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942



Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478

**MEXICO**

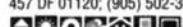
Aces Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729



Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Ascencio, Gaby Macias, 681-20276; fax, 681-26430



Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28



Hobby's Formula, Au observatorio 457 DF 01120; (905) 502-3620



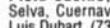
Hobby Model's Raceway, Blvd. Garcia de Leon, 1555, Morelid, Michoacan 58260; (431) 5-01-22



Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94



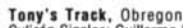
La Hielera, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabel, (42) 12-15-25



Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhart, (73) 19-12-38



R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47



Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141

**NETHERLANDS**

H.F.C.C. Hollandia, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820

**NEW ZEALAND**

Counties R/C Raceway, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09 23 86904



Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711



Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Prive, Auckland; Chris, (09) 838-5201

**NORWAY**

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 52 95

**PHILIPPINES**

Boyle R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hwy, Mayamot, Antipolo, Rizal; Jose "Boy" Chua, 721-2555



Philippine R/C Association, B.F. Homes Paranaque, Metro Manila 1700; Ronal/Manny Villaflor, 23-30-08

**SOUTH AFRICA**

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865

**SPAIN**

Club Social Seviliana, Ctra. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282



Motoclub Castellon R.C., Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411



Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298



ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 011-34-56-822652



CRAM, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952

**SWITZERLAND**

E.M.B.C.M. Raceway, Main Street, opposite police station, 8854 Sieben, Switzerland; Markus Schmid, 01-9233621



RFCV-Terraindu Levant, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax, 19 41 22 7790805

**VENEZUELA**

Las Fuentes R/C Club, 2da Calle las Fuentes El Paraiso, Caracas, DF 1020; Franco Agrusa, (02) 461-72-55



R/C Mariche, KM4 Zona Industrial, Del Este, Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993

**ZIMBABWE**

Mosi-Oa-Tunya, H9619 Highland Harare, Harare, Zimbabwe; Masioraland, Zimbabwe; 46237

**WEST INDIES**

Island Raceway, 8 Mile Post Jacks Hill, St. Andrew, Jamaica, West Indies; Rodney Littau, (809) 926-7034 or 927-1198



PRO-LINE

Attention track owners!

We've updated and expanded our Track Directory—and you can get in on the action! Just complete and return this coupon, making sure the information you give is accurate.

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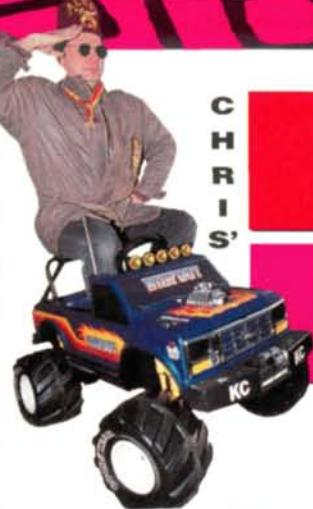
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Phone no. (required) _____

Check all that apply

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| <input type="checkbox"/> Indoor | <input type="checkbox"/> On-site hobby shop |
| <input type="checkbox"/> Outdoor | <input type="checkbox"/> AC power |
| <input type="checkbox"/> Off-road | <input type="checkbox"/> Automatic lap-counting |
| <input type="checkbox"/> Oval | <input type="checkbox"/> Food |
| <input type="checkbox"/> Banked | <input type="checkbox"/> Carpet |
| <input type="checkbox"/> Dirt | <input type="checkbox"/> available |
| <input type="checkbox"/> Carpet | <input type="checkbox"/> Concrete |
| <input type="checkbox"/> Concrete | <input type="checkbox"/> Asphalt |
| <input type="checkbox"/> Asphalt | <input type="checkbox"/> Wheelchair-accessible |

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Radio Control Car Action,
251 Danbury Rd., Wilton, CT 06897



BACK LOT

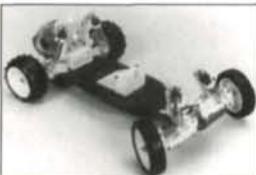
This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897.

Time Warp



April 1990



Team Associated Graphite RC10—\$189.99



6-cell SCR battery pack—\$26.99
7-cell SCR battery pack—\$34.99



Tekin BC210 charger—\$149.99



Novak T1X ESC—\$124.99



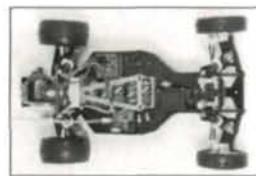
Trinity Monster Stock motor—\$17.99



Airtronics CS2P FM radio—\$154.99

Total \$699.93

February 1995



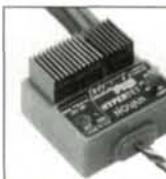
Team Associated Worlds Car—\$179.99



Trinity Sport Tech 6-cell battery—\$28.99
Trinity Sport Tech 7-cell battery—\$29.99



Tekin BC112A charger—\$119.99



Novak Hammer Pro ESC—\$109.99



Trinity Green Machine 2 motor—\$17.99



Airtronics CS2P FM radio—\$154.99

Total \$641.93

That's a \$58 savings today. And, though that might not seem like much, there's one important thing to remember: the '95 technology smokes the '90 technology. For example, the '90 graphite RC10 doesn't come with all the trick items that are found on the '95 Worlds car; the biggest difference is that the old RC10 doesn't have the Stealth tranny; it has the old 6-gear tranny. The list of differences goes on and on. The Worlds car, overall, is much better than the '90 graphite RC10.

Also, remember that everything on the list for '95 (except the radio) is far more technologically advanced than what was available back in '90. Motors are faster, batteries are better, speed controls are more efficient, and chargers have more cutting-edge features.

In addition, the prices we're dealing with today have been affected by the economy, inflation and even the yen/dollar exchange rate. If today's economy were anything like that of 1990, R/C-related-product prices would probably be even lower, and the comparison would be even sweeter still!

So, as you can see, there has never been a better time to be involved in this hobby. Not only is it cheaper now, but the equipment is also far better.